The
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Next Week at Brighton

THIS week-end large numbers of electrical men and women interested in electricity supply matters will be putting aside their normal duties as they prepare to attend the forty-second annual convention of the Incorporated Municipal Electrical Association.

On Monday night they will be assembling at Brighton, a place long conspicuous for its electrical enterprise and a favourite resort of the Association over and over again since the first inaugural convention took place in the year 1896, when the late Arthur Wright was one of its foremost leaders. We publish in this issue a record of current activities of Mr. W. N. C. Clinch and his staff, which shows that Brighton's reputation is being well maintained.

The president for this meeting is Mr. F. Forrest, the chief electrical engineer and manager at Birmingham, a city which owns and operates, on the most up-to-date lines, one of the largest and most successful municipal electrical undertakings in Britain. What Mr. Forrest has to say in his inaugural address on Tuesday will be awaited with more than usual interest, for whatever may be the subjects upon which authors of the several papers will speak, there is one predominant subject which is in the minds of supply men in all parts of the country.

Although, as we have said, those who attend the meetings are, for the time being, leaving their normal duties behind them for a few days, we are not forgetting that matters more or less abnormal have so preoccupied them of late that they might almost be described as normal at the moment. Questions relating to the future of many electricity supply undertakings are being deliberated upon more or less confidentially.

Although all documents officially circulated have been marked "Private and Confidential," and have been withheld from ourselves, no doubt for very good reasons owing to the delicate stage of negotiations preliminary to the drafting of the final policy by the Commissioners, it has proved impossible to prevent information from leaking through into Press channels. As examples, we may point to the speech delivered by the chairman of the Clyde Valley Power Co., abstracted on another page, and news items which are now appearing regarding other undertakings.

Such reports as have come to us in this way are not sufficient for us to base any general or conclusive comment upon them, and it may be that the President will feel that the situation is not one upon which much should be expected from him. But we think we can imagine many a private discussion between members and their friends during the Brighton week which will have little bearing upon the subjects coming under discussion in the official programme.

As it is credibly stated that objections and suggestions relating to the "White Paper" are required to be sent to the Minister of Transport by June 1st, the very day on which the President is to deliver his address, it would appear that what is said at the convention will not have much immediate influence upon the position.

No doubt at a later date, when the numerous points covered in the different sections of the "White Paper" have passed through the local and association stages, the entire matter will be brought out into the open again. Nobody, we suppose, imagines that problems that more seriously affect the industry than any that have been put before its several parts for many a year can be carried very far without the fullest and freest consideration from every standpoint being allowed. Doubtless we shall find that many of the Brighton assembly will have such thoughts as these in mind as they meet together.

For this reason, in addition to the fact that an excellent programme has been arranged at a very attractive seaside resort, we anticipate that next week's gatherings will be amongst the most successful, and privately perhaps the most "lively," ever held.

Commission Changes

THE death of Sir John Brooke, the deputy-chairman of the Electricity Commission, is probably responsible for the official announcement regarding the Commissioners being issued now instead of later. The approaching retirement of Sir John Snell from the chairmanship alone made it desirable that electricity supply interests should know with whom they would be dealing in discussing suggested changes, and the absence of Sir John Brooke made it doubly so. What is actually to take place is the retirement of Sir John Snell from the chairmanship at the end of 1937, and he will be succeeded by Sir Cyril Hurcomb, who becomes a Commissioner in June. The retention of the services of Sir John in a consultative capacity will ensure a measure of continuity in the later negotiation and legislative stages of the distribution schemes. Sir Cyril Hurcomb has been Permanent Secretary to the Ministry of Transport since 1927, and it would seem that Mr. Hore-Belisha has preferred to preserve continuity for the present rather than to introduce new personnel to strengthen the Commission while "crossing the stream."

Preserving Their Identity

IN the summary of conclusions which winds up the McGowan Committee's report it is stated: "Any attempt to carry through a scheme of reorganisation on a voluntary basis is bound to fail and legislation must confer definite and adequate compulsory powers." Point is given to this dictum by the recent refusal of the Newcastle-under-Lyme Town Council to participate in a voluntary amalgamation scheme suggested by the North-West Midlands J.E.A., although it is not averse to a "co-ordinating and consultative regional committee" which would function without smothering the identities of the authorities represented. Newcastle, in the persons of its Mayor (Alderman S. Myott) and its engineer (Mr. A. J. C. De Renzi), is the leader of the "under ten million units" authorities in their efforts to avoid extinction.

Mr. Railing on Industrial Personnel

As joint managing director of our largest electrical manufacturing company, as past-chairman of the Executive Council of the B.E.A.M.A., and as one who has been closely and personally interested in staff organisation and training during forty-seven years of the electrical industry, Mr. M. J. Railing is more qualified than most to speak on "Personnel Problems in Industrial Concerns." This was the subject chosen by him for the first of the series of Studd Management Lectures which he delivered at the Polytechnic, London, on Friday last (see page 802). The flood of matter that reaches editors of such papers as the ELECTRICAL REVIEW on different aspects of industrial management questions originates in minds of those who have studied the subject as a whole in books, or have specialised in one particular part of it in their personal avocation. While we have no desire to belittle such contributions, we feel that the industry will be glad to welcome the observations of one who can speak with the authority that follows from practical experience during years that have brought ever-changing aspects to staff problems both at home and overseas.

Parkinson Benevolent Committee

SEVERAL points may be selected for special emphasis in connection with the setting up of the Parkinson Benevolence Committee, which was foreshadowed at the recent annual meeting of E.I.B.A., and which is announced on page 798 of this issue. We believe that nobody is more anxious than Mr. Parkinson to stress the fact that his action does not imply reflection upon the administration of any existing charitable or benevolent funds in the industry. Further, it is profoundly to be hoped that there will not be any falling-off of financial support for E.I.B.A. because this special committee has been set up. Nobody imagines that claims of the needy will become fewer or less pressing because a committee of six gentlemen is concentrating upon the question of changes in organisation. A constant inflow of funds is most necessary in order to secure a better net result from a year's operations.

E.I.B.A. and the Future

AT the annual meeting the President invited all who had any helpful suggestions to make to get into touch with him, and, as stated on page 798, the Committee also now intimates its eagerness to receive any information likely to be useful. As many of us know, E.I.B.A. started in a very small way in a day of small things, and for many years it had to limit itself to small achievements, as reckoned in funds. It has tried in a variety of ways to adapt itself to changing conditions, and through the efforts of many self-sacrificing men has done wonderful work in innumerable unobtrusive and touching ways. Lord Hirst, who is one of the members of the Parkinson Committee, rendered splendid assistance as one of the Association's early presidents; not only has he knowledge concerning the character of its operations during a period in which the industry itself has made enormous expansion, but, as a leading industrialist, he understands the changes brought about by the introduction of State and private insurance and pension scheme. The Committee will give general satisfaction if it can find worthy ways of building up large resources without too frequent resort to agitating appeals through the Press and to floods of assorted postal publicity literature.

Our Export Trade

To gauge the extent of the recovery in our overseas electrical trade it is interesting to note that last month's exports were only 5 per cent. lower than in the corresponding month of 1929, the year when trade was at its highest prior to the depression. April electrical imports were 20 per cent. lower, and actually the balance of exports over imports was approximately £30,000 more than in April, 1929. Much of the electrical export expansion in the past two or three months has been due to cable requirements, in which field there is a steadily increasing flow of overseas orders.

Bus-Zone Protection

WHILE the use of cellular switchgear at the Hell Gate generating station of the New York Edison Co. makes conditions there somewhat different from those prevailing in Great Britain, the broad principles kept in view in reconstructing the switchgear, as a sequel to last year's burn-out, are the same. Everything is being done to prevent the spread of fault conditions beyond the section of plant involved. One feature is a system of protection for each bus-bar section controlling a generator and its associated feeders.

Two-part Tariff Contested

THE legality of Wimbledon's two part tariff is being contested by one of the undertaking's consumers. A writ has been served and the Town Clerk has entered an appearance. The plaintiff asks for an injunction restraining the Corporation from offering the two-part tariff in the present form. The case will be of considerable interest to all authorities (and they are many) with two-part tariffs.

The I.M.E.A. CONVENTION

is being held at Brighton from May 31st to June 4th. Our next issue will contain reports and photographs from our staff representatives at the Convention, together with several special articles.

The I.M.E.A. Convention

Next week's arrangements at Brighton

ON Monday next over 1,500 people from all parts of the country will assemble at Brighton to attend the forty-second annual Convention of the Incorporated Municipal Electrical Association, which is being held under the presidency of Mr. F. Forrest, city electrical engineer and manager, Birmingham.

The programme, which is outlined below, is an attractive one, both from the business and social points of view. Domestic refrigeration, the development of electricity supply in rural areas and electric thermal storage, three of the subjects to be discussed, are at present very much in the minds of all supply engineers who have load-building at heart, while members of electricity committees will welcome a clarification of their duties by Alderman E. Huntsman.

Apart from four evening social functions in the way of receptions, banquets and dances, an excursion to Shanklin has been planned for Friday afternoon, June 4th, and the town's brochure, which is to be supplied to every delegate with his badge, has many happy suggestions for filling in any spare time. On displaying their Convention badges, delegates will be admitted to the Aquarium free of charge and will be given free access to recreational facilities.

Opportunities are to be afforded by the Brighton Corporation for delegates to inspect the Southwick power station, where the new generating plant, described in last week's ELECTRICAL REVIEW (page 755), is to be seen.

The programme is as follows :—

Monday, May 31st:—

Issue of badges at Convention office, The Dome (10 a.m. to 6.30 p.m. except between 1 and 2.30 p.m.).

Official opening of Electrical Exhibition at the Corn Exchange by the Mayor of Brighton, Coun. J. Routley (3 p.m.).

President's reception at the Royal Pavilion (8.15 p.m.), followed by dancing.

Tuesday, June 1st:—

Opening of the Convention by the Mayor, followed by the presidential address (9.50 a.m.).

Parade and inspection of electric vehicles (11.15 a.m.).

A paper on "Electric Thermal Storage" by Commander F. J. C. Allen and Mr. W. C. Parker, Fulham borough electrical engineer (2.30 p.m.).

Reception by the Mayor and Mayoress of Brighton at the Royal Pavilion and dancing (8.15 p.m.).

Wednesday, June 2nd:—

A paper entitled "The Position and Duties of a Committeeman To-day," by Alderman E. Huntsman (10 a.m.).

Brighton Rotary Club lunch (1 p.m.) at the Ship Hotel:

A paper on "The Development of Electricity Supply in a Rural Area," by Mr. V. A. Pask, Norwich city electrical engineer, and Mr. R. W. Steel, also of Norwich (2.30 p.m.).

Thursday, June 3rd:—

A paper on "Domestic Electrical Refrigeration," by Mr. W. F. T. Pinkney (North-Eastern Electric Supply Co.), and Mr. A. J. Ryan, Hastings borough electrical engineer (10 a.m.).

Electrical Association for Women luncheon at the Princes Restaurant (1 p.m.).

Reception by the President at the Exhibition (3.30 p.m.).

Annual banquet and ball at The Dome (7 for 7.30 p.m.).

A view of Brighton Promenade looking west

Friday, June 4th:—

I.M.E.A. Council meeting (9.30 a.m.).

Extraordinary general meeting to amend Articles of Association (10.15 a.m.).

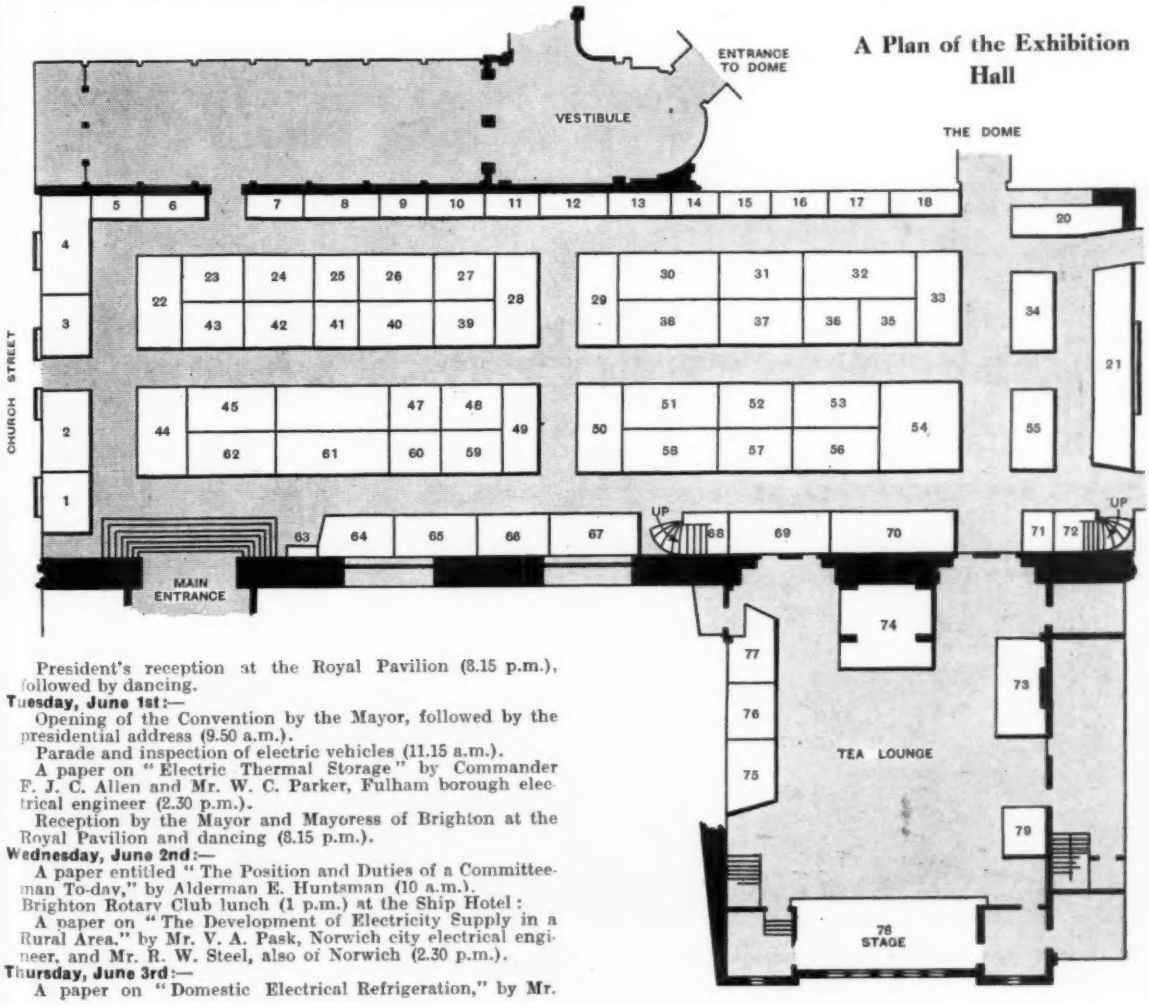
Annual general meeting (10.30 a.m.).

Visit to Shanklin, I.O.W. (2.30 p.m.).

Dance and cabaret at the Grand Hotel (9 p.m.).

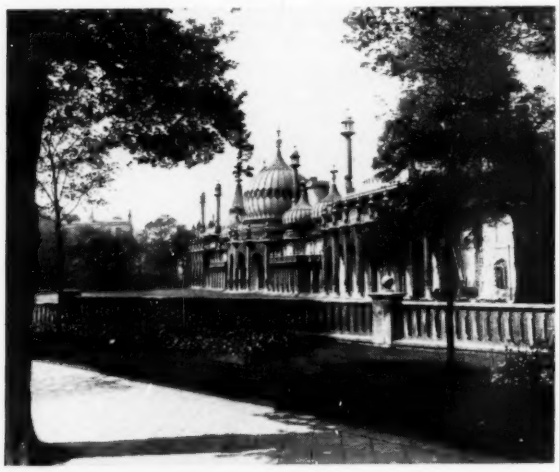
In spite of the somewhat restricted space available, the electrical exhibition to be held at the Corn Exchange is likely

A Plan of the Exhibition Hall



to be still more representative than that of last year and provide an excellent opportunity for seeing under one roof the latest developments in domestic electrical equipment, street-lighting apparatus, &c.

After Monday's official opening the exhibition will be open each day till Friday from 10 a.m. to 6 p.m. This year there



The Royal Pavilion, Brighton

are about eighty stands. A plan of the exhibition hall is reproduced herewith, together with an alphabetical list of exhibitors, the stand numbers being given in parentheses:—

Actadis, Ltd. ... ... (52)
Aidas Electric, Ltd. ... (24)
Air Conditioning & Engineering, Ltd. ... (36)
Bastian & Allen, Ltd. ... (17)
Belling & Co., Ltd. ... (37)
Benjamin Electric, Ltd. (23)
Berry's Electric, Ltd. ... (67)
Bertram Thomas ... (26)
Bratt Colbran, Ltd. ... (35)
Bray, Geo., & Co., Ltd. (27)
Brighton Corporation ... (74)
Britannia Batteries, Ltd. (79)
British Electric Domestic Appliances, Ltd. ... (69)
British National Electrics, Ltd. ... ... (49)
British Sangamo Co., Ltd. ... ... (7)
British Thermostat Co., Ltd. ... ... (10)
British Thomson-Houston Co., Ltd. ... ... (45)
Bulpitt & Sons, Ltd. ... (60)
Burco, Ltd. ... ... (48)
Cable Makers' Association ... ... (73)
Callender's Cable & Construction Co. ... ... (11)
Carron Company ... (39)
Chloride Electrical Storage Co., Ltd. ... ... (79)
Corfield-Sigg, Ltd. ... (8)
Crompton Parkinson, Ltd. ... ... (13)
D.P. Battery Co., Ltd. ... (79)
Drake & Gorham Wholesale, Ltd. ... ... (65)
Edison Swan Electric Co., Ltd. ... ... (30)
Electric Lamp Manufacturers' Association ... (70)
Electric Vans, Ltd. ... (79)
Electric Vehicle Committee of Gt. Britain, Ltd. ... ... (79)
Electrical Association for Women ... ... (76)
Electrical Apparatus Co., Ltd. ... ... (14)
Electrical Contractors' Association (Inc.) ... (75)
Electrical Development Association (Inc.) ... (78)
Electrical Industries Benevolent Association (77)
Elexcel, Ltd. ... ... (2)
Ellison Insulations, Ltd. (68)
English Electric Co., Ltd. ... ... (61)
Falk, Stadelmann & Co., Ltd. ... ... (32)
Ferranti, Ltd. ... ... (46)
General Electric Co., Ltd. ... ... (54)
Goodliffe Electric Supplies, Ltd. ... ... (72)
Greene, Phillips & Co.... (42)
Hague & McKenzie, Ltd. ... ... (16)
Harcourts, Ltd. ... ... (64)
Hawkins, L. G., & Co., Ltd. ... ... (29)
Heatrae, Ltd. ... ... (28)
Henley's (W. T.) Telegraph Works Co., Ltd. (1)
H.M.V. Household Appliances ... ... (55)
Holophane, Ltd. ... (3)
Hoover, Ltd. ... ... (18)
Hotpoint Electric Appliance Co., Ltd. ... ... (44)
Hurley Machine Co. (England), Ltd. ... (6)
Iddon, Victor H., Ltd.... (63)
International Refrigerator Co., Ltd. ... ... (40)
Jackson Electric Stove Co., Ltd. ... ... (51)
Johnson & Phillips, Ltd. (47)
J.P. Tubular Heaters, Ltd. ... ... (43)
Kelvinator, Ltd. ... ... (50)
Lightfoot Refrigeration Co., Ltd. ... ... (38)
Low, Archibald, Electrics, Ltd. ... ... (31)
MacGregor & McCallum, Ltd. ... ... (30)
Macpherson, Donald, & Co., Ltd. ... ... (5)
Measurement, Ltd. ... (41)
Metropolitan-Vickers Electrical Co., Ltd. (21 & 79)
Moffats, Ltd. ... ... (22)
Morrison, A. E., & Sons, Ltd. ... ... (70)
Murphy Cars & Trucks, Ltd. ... ... (70)
Oldham & Son, Ltd. ... (73)
Premier Electric Heaters, Ltd. ... ... (4)
Partridge, Wilson & Co., Ltd. ... ... (70)
Pressed Steel Co., Ltd.... (34)
Radiovisor Parent, Ltd. (15)
Revo Electric Co., Ltd.... (62)
Reyrolle, A., & Co., Ltd. (53)
Rheostatic Co., Ltd. ... (25)
Santon, Ltd. ... ... (66)
Servis Electric Washing Machines ... ... (59)
Siemens Electric Lamps & Supplies, Ltd. ... (35)
Simplex Electric Co., Ltd. ... ... (38)
Stokes Appliances, Ltd. (71)
Thermovent (1936), Ltd. (9)
Tricity Cookers, Ltd. ... (56)
Tudor Accumulator Co., Ltd. ... ... (79)
Unity Heating, Ltd. ... (57)
Venner Time Switches, Ltd. ... ... (12)
Westinghouse Brake & Signal Co., Ltd. ... (79)
Young Accumulator Co. (1929), Ltd. ... ... (79)

The Brighton Corporation undertaking, under the guidance of the borough electrical engineer, Mr. W. N. C. Clinch, pursues an active development policy, and some aspects of this work are dealt with in an article appearing in subsequent pages of this issue. We also publish some notes on the modern distribution system which has been built up in the past few years.

We are indebted to the Brighton Corporation Publicity Department for the photographs used on this and the preceding pages.

The Brighton "Daddy Longlegs"

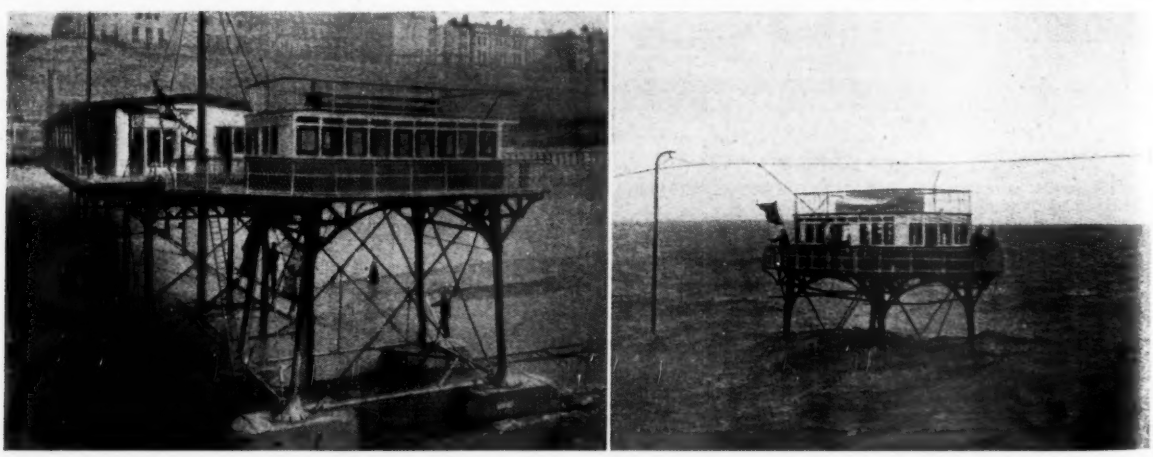
THE death of Mr. Magnus Volk, recorded in our obituary section to-day, recalls an extraordinary electric traction scheme which he devised about forty years ago. A description of the scheme appeared in the ELECTRICAL REVIEW of November 27th, 1896, from which the accompanying illustrations are reproduced.

A track was laid between Brighton and Rottingdean—a distance of three or four miles—which was 14 ft. below water in some places at high tide. The track consisted of two pairs of rails. Upon it ran the car which looked somewhat like the upper works of a Channel steamer. It was capable of carrying about 200 people and was mounted on four tall legs terminating in specially shaped bogies each with four wheels.

Power was collected by means of a pair of trolley poles from overhead wires and transmitted to two 30-h.p. G.E. motors supplied by the B.T.H. Co. From these, long vertical-geared shafts went to the axles of the wheels, the control being on similar lines to that of a tramcar.

The system had its own generating plant at Rottingdean, comprising a high-speed double-acting Sisson engine coupled to a four-pole G.E.C. railway generator.

There was a constant battle against heavy seas during the brief run of this curious amphibian, which resulted finally in a victory for the ocean and the abandonment of the system.



The "Daddy Longlegs" which ran between Brighton and Rottingdean forty years ago. (Reproduced from the ELECTRICAL REVIEW of November 27th, 1896)

Brighton's Modern Distribution System

PRESENT-DAY distribution activities of the Brighton undertaking are largely governed by peculiarities associated with the recent increase of the borough area and also by the progressive and gradual scheme for changing over from d.c. to a.c., coupled with the raising of the main e.h.v. distribution voltage.

With the gradual change-over from d.c. to a.c. at a rate governed largely by the cost of compensation the load density of the remaining part of the d.c. system has grown to such an extent that the d.c. load is greater than it was at the commencement of the change-over. There is now about 21,300 kW of d.c. plant and 27,350 kW of a.c. plant installed.

In the main distribution centre at North Road three d.c. systems are catered for by rotary plant, namely, 500-V traction, 230-V three-wire and 460-V three-wire. On the 460-V system are the three supervisory and one rectifier sub-stations on the fringe of the densely populated area. Any new load within the present d.c. area, say, of 50 h.p. upwards, is supplied at a.c. without question, and if this necessitates a new cable then the supply is regarded as the nucleus of a local a.c. system of distribution of the future.

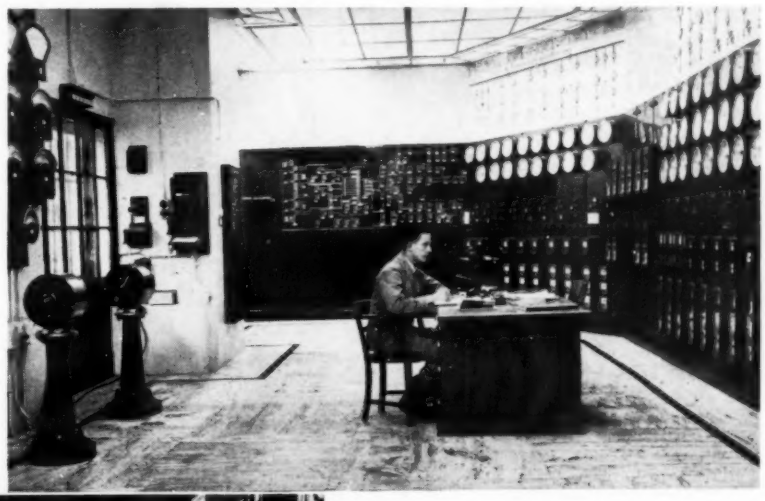
The nerve centre of practically all of the system is the primary sub-station at North Road, the site of Brighton's original generating station. All the new area, of course, is being developed with a.c., and from North Road radiate three main 11-kV distribution rings. One in the centre of the towns forms roughly a rectangle ¾ mile long and ⅜ mile wide. A ring to the east runs by cable in one direction approximately along the coast of Portobello, a point about 6¼ miles from North Road, and in a north-easterly direction to Whitehawk estate by underground cable for a distance of about 1½ miles. The gap between Whitehawk and Portobello is completed by means of overhead transmission *via* Balsdean, 4¼ miles from North Road and Telscombe, 6 miles from North Road and approximately one mile north of Portobello.

A ring to the north is roughly triangular with the angles at North Road in the south, Patcham in the north-west and North Moulsecoomb in the north-east. Overhead lines radiate from Patcham northeast to Poynings, Fulking and Newtimber, and from North Moulsecoomb north-east to Falmer. The overhead lines indicate roughly the rural distribution areas.

To the west of Hove in the district of the Brighton generating station (Southwick) there is the small densely populated area of Portslade and Southwick, which is served by a ring-main fed from two of the main transmission cables between the power station and North Road. There are eight of these cables, and they transmit at 11 kV *via* 6,000-kVA, 8/11-kV Hackbridge transformers. These transformers are to be fitted with the makers' protective system by which a fault in the transformer is indicated by the alteration of the condenser capacity brought about by the replacement of oil in a relay by fault gas.

A recently installed bank of reactors at the power station couples the two 45,000-kW main bus-bar sections and is designed to limit the short-circuit energy to 500,000 kVA and to permit a power transfer of 30,000 kVA. They are of English Electric manufacture. In the circuit feeding a new 8-kV auxiliary board in the power station from the main generating board there is a bank of Fuller reactors which limit the transference to 150,000 kVA. With the outdoor transformers and reactors at Southwick there are a 2,600-kVA and a 1,800-kVA G.E.C. auto-transformers which govern the bulk supply to Shoreham. The main transmission cables all cross the Shoreham harbour in a trench dredged 8 ft. deep, and a recent Siemens installation consists of six 0.25 sq. in. 11-kV, three 0.25 sq. in. 33-kV and six 20-core pilot cables. The cables were placed in position over the trench by barrel floats which were afterwards released to lower the cables into the trench.

The main 11-kV switchboard feeds three subsidiary boards, one for the three ring mains of the a.c. distribution system, *via* reactors, and the other two serving the rotary plant in North Road *via* two 6,000-kVA and two 11,000-kVA, 11/8-kV English Electric transformers.



[*Elec. Rev. photos.*

Above: The distribution control room at North Road. Left: A typical sub-station layout

The control room at North Road is believed to be the only one of its kind in this country associated with distribution only. It consists of a main and two sub-control boards, but the modernised control board in the convertor house is also essentially a part of the system. There is a recording voltmeter permanently connected to the bus-bar on the main board and a similar instrument connected to each group feeder on the sub-boards, so that at all times any fluctuation on the h.v. system is recorded, and whether the trouble is internal or external can be easily deduced.

Flanking the control boards on one side is a geographical representation of the e.h.p. system, in which, by selected coloured lights, sub-stations in parallel on the l.v. side are indicated. On the other flank a diagram presents a complete picture of the switching of the whole of the 11-kV system at any moment. Different types of switches, such as draw-out, non-draw-out, isolating, fuse-switches and fuses only are indicated by different colours. By a system of pilots radiating from multiple-selector switches in the control room to various parts of the town indications of the d.c. voltage at key points can be obtained at any moment on common instruments.

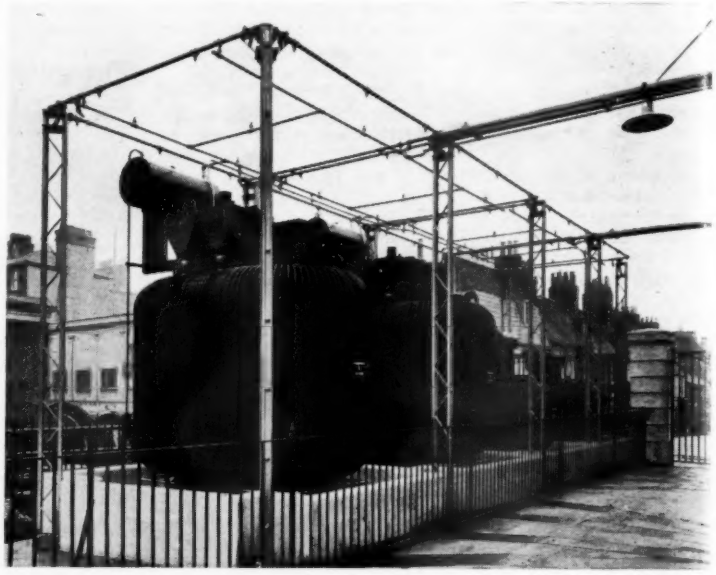
As a preliminary measure to a system of supervisory control of all the h.v. and l.v. switch tripping in the sub-stations throughout the system the undertaking is now introducing a scheme for indicating such tripping. Throughout the a.c. system the sub-stations, apart from size, have a common lay-out so far as is practical with the necessarily varying dimensions and location of the building itself, so that it will be sufficient to refer merely to one of each class of sub-station—densely populated area, new residential area and rural area.

In the basement of Embassy Court a sub-station designed for an ultimate capacity of 2,000 kVA has at present two 500-kVA transformers. The switchgear is designed for the larger transformers. By compensation compounding the voltage is automatically controlled between 230 V (no load) and 240 V

(full load) and suitable coupling relays ensure that the transformers shall remain in step. It is usual to fit automatic regulation to all transformers above 100 kVA and they operate in one per cent. tappings.

The total output of the sub-station is recorded on the low-voltage side so as to render possible a system of weekly reports to the chief engineer and manager of the total input of the system and of the various sub-stations' output. *Via* Ellison main l.v. circuit-breakers the l.v. supply is distributed by a board constructed of Lucy tailless fuse units fitted with English Electric high rupturing capacity fuses.

In the sub-sations which we visited we observed equipment bearing the names of the following :—Brush, Hackbridge, Ferranti, Parsons, Fuller, Ferguson Pailin, Reyrolle, Allen West, Crompton Parkinson, Ellison and Lucy. As far as possible and definitely on a permanent basis sub-stations are only run in parallel on the l.v. side with others on the same h.v. ring.



Step-down transformers at North Road, showing "Mulsifyre" system

[*Elec. Rev. photo.*

Sequence Control

In one of the sub-stations on the Whitehawk estate there are two 500-kVA transformers arranged with other sub-stations in the group for sequence automatic control. Because of the heavy loadings separate automatic operation is not satisfactory, and by keeping all the transformers on the same tappings the load is shared equally and the load factor works out right.

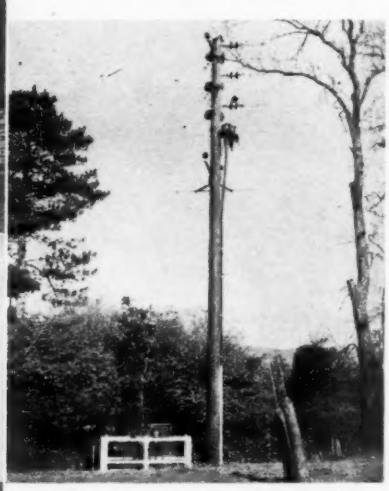
At Poynings the overhead feeder from Patcham is continued from the outskirts of the village to the sub-station by underground cable, and this line, and also three outgoing feeders to the Dyke Hotel, to Newtimber and to Fulking, are all equipped with Ferguson Pailin auto-reclose equipment which closes mechanically three times before the lock-out. The underground feeder up to the Dyke Hotel, representing a vertical distance of 600 ft., is fitted with special barrier joints to prevent oil drainage.

At Telscombe Village, which is fed by a spur from the east ring of the system, the supply is afforded by means of a Crompton T.A.P. transformer and switchgear unit. At Fulking we saw one of the very few kiosks on the system. It is of 50-kVA capacity.

Mr. Carr, constructional engineer, who took us round the system, said that kiosks are not often used by the undertaking owing to the limits which they impose upon extensions of the plant which they house.

Fire Precautions

Fire protection has received very careful consideration at Brighton. Culverts under the North Road station are sectionised, and a pipe from each section is brought out to a flume in the "Richlux" smoke-indication section, from which a light-sensitive cell gives audible and visible alarms when operated by smoke density in the flume circuits. Flooding any sections of the culverts with CO_2 can be effected electrically from the control room. The step-down auto-transformers at North Road are equipped with the "Mulsifyre" (Mather & Platt) system of fire protection. Frangible quartz bulb detectors at strategic points control the release of the "Mulsifyre" jets. The water is stored in a 1,000-gal. air and water tank containing 500 gal. of water under a pressure of 100 lb. per sq. in. Release of water spray from the pipe-work on to oil from the transformers creates a non-inflammable emulsion.



Top left: Transformers and reactors at Southwick power station. Bottom left: A country-house pole transformer supply near Poynings. Right: Transforming and switching station at Dale Hill fed from angle pole in 11-kV line

[*Elec. Rev. photos.*

At the Embassy Court sub-station, where risk to the flats as well as to the sub-station had to be considered, CO_2 fire equipment is installed. Over each vulnerable section of the plant is a frangible quartz bulb controlling the gas emission In the event of a fire a bulb bursts at 130 deg. F. and releases a trip mechanism which relieves the weights on the CO_2 cylinders whereby gas is discharged through horns from a pipe around the station.

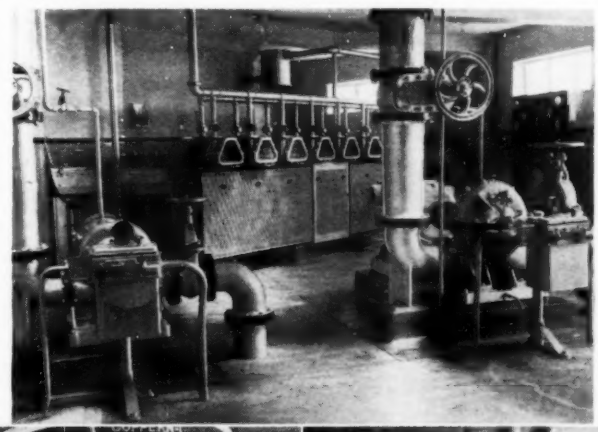
Load Building at Brighton

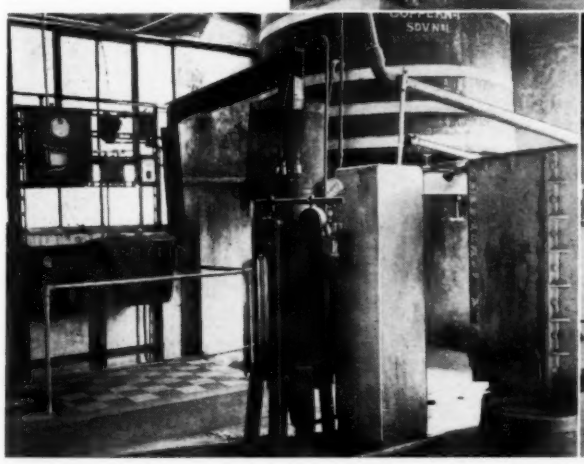
DURING a recent study of the load-building activities of the Brighton Corporation electricity undertaking, by the courtesy of Mr. W. N. C. Clinch, engineer and manager, we were constantly reminded in different ways of the importance attached to personal contact with the consumer. The idea is inculcated in every member of the staff and the business-getting organisation is built round it.

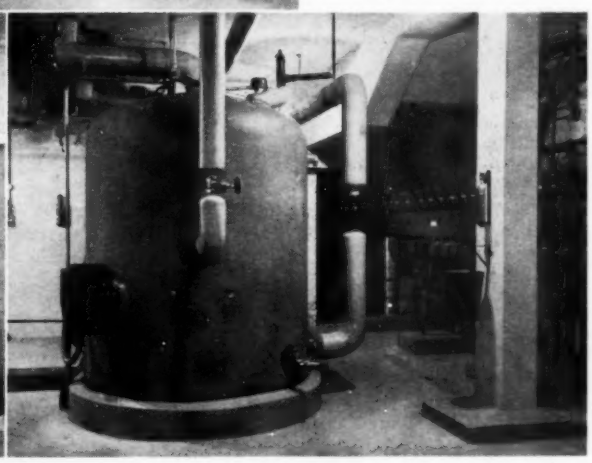
The Brighton area is practically wholly residential, and within its sixty or so square miles, extending, very roughly, from Telscombe in the east to Southwick in the west and from the sea to Newtimber in the north, excluding the Hove area of, say, two square miles, there is a fast-increasing population of at present about 175,000. With these facts in mind the following load growth statistics afford an initial broad conception of the nature of the load-building work that is going on.

During the year 1933-1934 41.8 million kWh was sold to the undertaking's own l.v. consumers, while the corresponding figure for the year ended March, 1937, is 76.7 million kWh. The period represented by these two groups of figures is that during which a change-over from d.c. to a.c. has gradually been taking place in the densely populated area at a rate governed by the cost of compensation. Yet the corresponding d.c. consumption figures for the two years in question show an increase from 31.3 million kWh to 39.3 million kWh.

The efforts seem to be taking place in three main fields, representing three classes of load development. They are the densely populated area of older Brighton with its many pre-war houses, modern blocks of flats, hotels and boarding houses and various places of entertainment and amusement which contribute towards Brighton's popularity as a holiday centre; a large new residential area within the semi-circular belt two or three miles deep around the town; and a few more or less scattered rural districts within an outer belt. Each of these fields embraces a small measure of industry.







[*Elec. Rev.* photos.

Top: Ozone treatment plant at Black Rock bathing pool—h.f. discharge equipment in rear. Left: Wort-heating installation (electrode boiler) at Poynings Brewery. Right: Immersion-heater storage boilers in Mitre House

Under the sales engineer each of a number of assistants has charge of a section of the area, and while the duties cover the consumers' interests generally the main efforts of each assistant are directed towards getting new business of any description within his area. For new-property business direct personal contact is the primary duty of each development assistant, not only with the consumer, but with the builders or estate developers at the very earliest opportunities. For existing-property work the services of the local contractors as canvassers are secured by a scheme under which a contractor receives as commission the first quarter's rent for apparatus hired as the result of a genuine business introduction. All this major development work is supported by advertising attractive showrooms and demonstration work.

Cooker demonstrations are regarded from a broader angle than the name implies. Their greater value lies in attracting other and more profitable classes of business. In addition to the showroom work two demonstrations at home are offered for every cooker installed. Further, the older cooking consumers are visited in the less busy periods. At Rottingdean, where the supply was recently taken over from a small concern with a 40-year-old gas-engine and battery station, the undertaking has built a branch showroom with an imposing wide-curved window.

By far the biggest plank in the load-building platform at the moment is in connection with estate development. This has a different meaning from that of building activities in most, if not all other, towns, including London. In the valleys leading to the sea from the South Downs one can see the many estate developments speedily contributing towards the huge new residential area, which cannot be regarded as merely the extension to a town. There is, as elsewhere, the tendency for many in the town to move to the outer districts, but this new residential area is absorbing many more people from other towns and areas, especially London.

It is particularly in connection with this estate-development work that early personal contact is practised, the major efforts being directed towards getting provision made for services other than lighting. It is regarded as reasonable for the estate developers to contribute something towards the cost of cabling the estate if provision for lighting only is made, so that in return for an agreement to wire the houses for all services the undertaking offers to lay the necessary mains free.

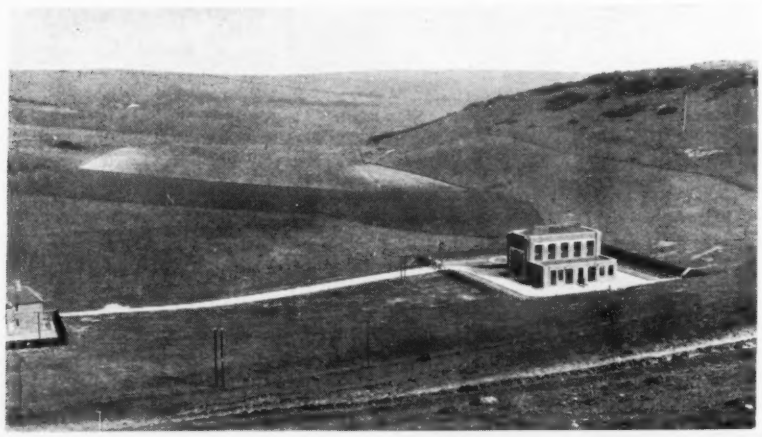
As soon as word is received of a proposed estate in any part the development department establishes direct personal contact with the estate management, and following the necessary negotiations an estimate of the connected load is passed on to the distribution department, which arranges for a supply on the basis of a maximum load of 20 per cent. of the connected load. Occasionally building operations have progressed so far that it is not possible to establish the distribution system on a permanent basis in time for the first consumers, but rather than risk loss of business because of delayed supply temporary distribution is provided for by a mobile sub-station which consists of a low-voltage distribution pillar and a Long and Crawford high-voltage switch-fuse bolted on either side of a 50-kVA transformer.

Care is taken that the importance attached to early personal contact with builders and estate managers does not tend to override the necessity for establishing an early link with the consumer. Immediately application is made, by writing or personally, the facilities available for the various services are stressed to the prospective consumer, and the office assistants are able to give much help in this way by means of an efficiently maintained system of office records.

It was pleasing to hear Mr. Lynn, the sales engineer, say, "We have got to educate the builder past the idea that two central plug points provide adequate electrical facilities for the household."

It is considered that requirements in electric lighting and space heating are met by the progressive builder who is now alive to the fact that adequate provision of such equipment provides him with valuable "selling points." We agree that the "built-in" fire has done much to familiarise the builder with the advantages of electrical services, but there is a need for warning and criticism. On one estate a 1-kW corner fire was installed opposite the door in a 12 ft. by 13 ft. type of living room. Such inadequacy in both heating capacity and the incorrect position of the fire will do much harm to the electrical cause.

Where fires and power are used it is easy to show the consumer the advantages of the undertaking's domestic-contract rate (two-part tariff), and once he is convinced of this the way is indicated to cooking and water heating. For the moment the main sales drive is directed towards the kitchen for, as we have already indicated, the cooker has been found to "set the pace" for the other larger domestic uses of electricity. Great efforts are made to get new houses wired for a cooker *during* building operations. Apart from the broader business-getting question two other important considerations support this cooker facility scheme. The undertaking is not called upon for capital outlay for the wiring on a rental basis, and the consumer is not displeased by having the house decorations disturbed by subsequent cooker wiring. When the cooker wiring in a new house for sale is completed the outlet is covered by a metal disc indicating "Provision for an electric cooker." Some builders have been influenced to provide bosses in the water cisterns for the insertion of immersion heaters and thermostats, but provision for wiring for water heating is not pressed to the same extent because the different requirements of consumers require different layouts.



The undertaking is to be congratulated on its appreciation of the fact that the average purchaser of estate houses cannot conveniently meet sudden demands for, say, hotplate renewals and water-heater descaling and on its maintenance scheme which is designed to overcome this difficulty. For 5s. a quarter the undertaking will maintain a cooker, water heater and a wash boiler—an insurance against trouble. The apparatus has to be in good working order in the first place and the maintenance is limited to the actual electrical components and to descaling.

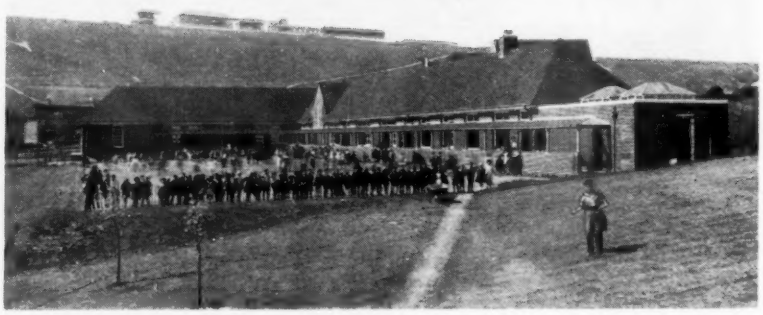
For some years now the Brighton Council has developed its own housing estates on an all-electric basis, and this has had a good effect on private-estate work. The undertaking, however, finds it no easy task to persuade a builder to "go all-electric." Many builders argue that the fully all-electric scheme might prevent house sales. The undertaking's answer to this is the six instances in which the builders have equipped all the houses with a cooker, a water heater, a wash boiler and fires. In no case has there been any difficulty in completing the estate and selling the houses, and in three cases —Ladies' Mile, Rottingdean, Vale and Mill Oak estates—the builders have started second estates on the same basis. On the Millhouse estate we saw houses and bungalows each equipped with a water heater, wash boiler, cooker and fires, while £695 houses on the Seadown estate each have a cooker, refrigerator, wash-boiler, a 12-gal. water heater and two built-in fires. On Ladies' Mile Estate, with 820 houses, there are two 1,000-kW sub-stations, and on Oil Mill Estate, which is now being developed and has at present about 200 to 300 houses, there is a 250-kW kiosk.

Commercially, the undertaking's most difficult problem in connection with modern residential flats is the one-room type. Most of the tenants in this kind of dwelling use very little electricity, in many cases representing merely short-period lighting for retiring at night and, in the winter months, similar consumption in the morning. The consumers of this class in some of the new blocks of flats in the densely populated area are metered direct, while in other instances the landlord is dealt with direct and he "sub-meters" his tenants. Doubt is still felt as to which is the lesser of the two evils, namely, heavy capital cost for rising mains and meters on the one hand or overcharging for electricity by the landlord or the other.

Generally, however, the undertaking is well satisfied with its flats business, and other than the one-room dwellings are dealt with as ordinary houses. Builders of flats and landlords are increasingly realising the value to themselves of adequate electrical services, and in some cases the landlords have undertaken to pay the fixed charges, leaving the transaction between the undertakings and tenants on a flat-rate basis.

Brighton's latest flats are at Withdean Court, where there are 88 one-room to five-room dwellings in five blocks. They are wired for all services and equipped by the landlord with a circulator in the hot-water tank and a refrigerator. Embassy Court is a large modern block of 68 flats in the centre of the town where space heating and domestic hot-water supplies are afforded by electrode boilers as "landlord services," the tenants dealing with the undertaking direct for consumption and equipment hire in connection with cooking and other services. The space-heating system is the Richard Crittall hot-water panel scheme and the two 350-kW, 400-V Bastian & Allen electrode boilers are automatically controlled and operate in conjunction with three large storage tanks from which the hot water is circulated round the system. At three points in the block vertical chases carry rising mains to the top of the building, and there are service tee-offs at each floor. The boilers are controlled on the off-peak principle, 16 hours' supply being permitted per day at from 8.30 p.m. to 7.30 a.m., from 9.30 a.m. to 12.30 p.m., and from 1.30 p.m. to 3.30 p.m. The annual consumption is 1.4 million kWh and the maximum demand is 600 kW.

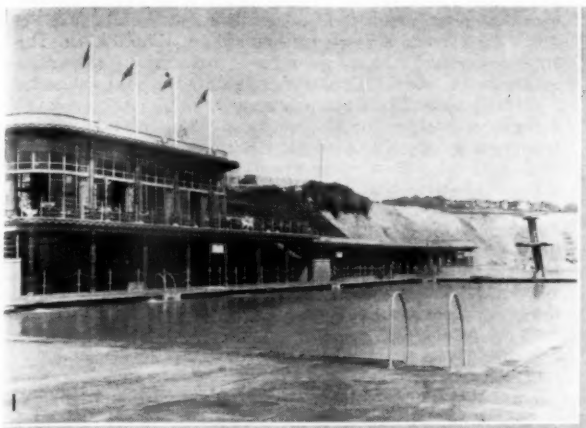
Left: Balsdean pumping station and overhead line service. Below: The Whitehawk Infants' School which is "off-peak" heated

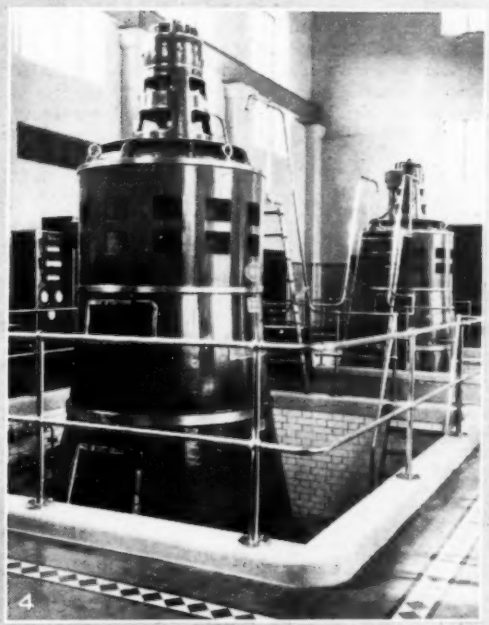


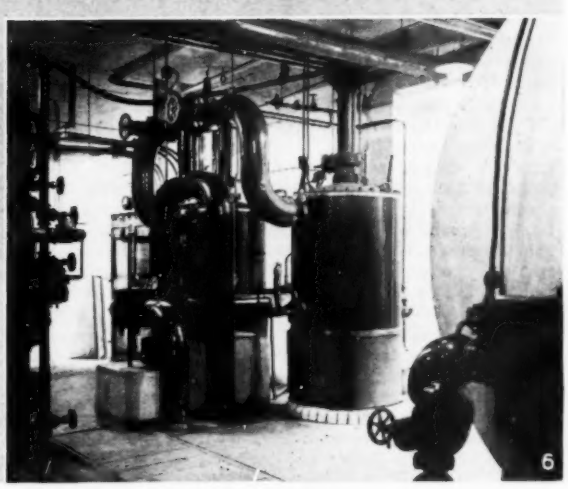
[Elec. Rev. photos.

Mitre House, with 48 flats, offices and shops, in the centre of the town, is another instance of off-peak water heating, but in this case for domestic services only. The two 1,000-gal. Bastian & Allen boilers are each fitted with two 30-kW banks of immersion heaters. The boilers feed the system direct, are maintained with water under a static head of 85 ft., and are controlled between 155 deg. F. and 165 deg. F. Direct low-temperature heating by means of specially made G.E.C. panel heaters provide "landlords' heating" for the flats and offices, the shops being direct consumers of the undertaking.

Brighton appears to be adequately serving its estates with schools, and the undertaking deserves credit for the close







Some Installations on the Brighton Corporation's System

1. The new Black Rock bathing pool and café. 2. Rottingdean showroom and sub-station. 3. Lime kilns and service lines at Dale Hill. 4. Synchronous-motor pumps at the new Balsdean pumping station. 5. Cooking equipment at the Black Rock Café. 6. Electrode boiler installation at Embassy Court

watch it has kept on the good opportunity presented in this way. We saw some excellent buildings equipped for electrical space heating in different ways, such as panel heating, ceiling radiation, and boiler-fed hot-water radiators. To point to one example only, the Whitehawk infant school is a one-storey building of the "all-exterior" wall and roof type, with correspondingly increased heat losses. It accommodates 500 children, and the electricity supply is afforded on the off-peak load principle with "on" hours of from 10 p.m. to 7.30 a.m. and 1.30 p.m. to 3 p.m. The consumption is 212,000 kWh per annum, with a maximum demand of 100 kW.

The undertaking's industrial load may be small, but it obviously represents "quality" load, largely, we should say, as the result of careful negotiation and judicious operation of tariffs. Most of the installations we have in mind are in the less populated areas, and we recommend any or all of them to the attention of delegates to the I.M.E.A. Convention.

Electricity in a Brewery

If only because of its rural industry aspect the small brewery at the little village of Poynings has perhaps the greatest claim to electrical interest. During the summer the supply is unrestricted, but from October to November it is not available between 4 p.m. and 7 p.m. A 100-kW, 400-V B. & A. electrode boiler is used for steam raising to 80 lb. per sq. in. The steam is required to maintain pre-heated wort at boiling point in a 700-gal. vat after raising its temperature from 140 deg. F. About 250 kWh is consumed per brew. The electricity supply to the boilers is automatically controlled by both the internal water pressure and water level, and Mr. Molesworth, the proprietor, spoke enthusiastically of the great convenience of being able to obtain a small quantity of hot water for cleaning within five minutes of switching on. Electricity is also used for compressor driving, bottle washing and conveying, and the yearly consumption is 47,000 kWh, with a maximum demand of 120 kW. The Balsdean pumping station, at the site of the town's new 240-ft. deep wells and two-million gal. reservoir, will prove of particular interest to those members who saw one of the motor pumping sets on test in the works, at Alloa, of the Harland Engineering Co., Ltd., during the electrical meetings in Scotland last summer. Each pump will deliver six million gal. of water in 24 hours, and the reservoir at a level of 210 ft. above the pumping station feeds to Brighton or other reservoirs on the system by gravity. Each of the two 780-h.p., 3,000-V synchronous induction motors drives two pumps, the one at the bottom of the well lifting the water to a booster pump at the top of the shaft.

Electricity is charged for at various load-period rates, but the bulk of the pumping, we believe, in done at night. Between March, 1936, and April, 1937, 1.2 million kWh was consumed, but both pumps were not installed during the whole of this time.

At Portobello, a point in the east of the area to which the whole of the town's sewage flows by gravity, three 100-h.p. motor pumps 80 ft. below the ground level assist the discharge to sea. Each pump will deal with half a million gallons per hour, and the total consumption last year of 172.7 million kWh included also power for the priming-pump and sluice-gate drives and lighting. Near Dale Hill we saw some lime kilns where electricity is gradually converting the equipment to more efficient driving, and also Ovingdean Farm, where electricity is used for cooking and fires in the house, for lighting in the barns, and the cowsheds, for threshing, root and chaff cutting, and driving dairy washing plant. The farm consumption for last year was 13,537 kWh.

Truly Rural

Truer examples of rural development in the sense of sparseness are a country house near Poynings, where a 10-kW pole transformer serves a cooker, radiator and smaller appliances; and Lady Buxton's house and the Rectory at Newtimber, which are supplied separately from an outdoor transformer and switching station at ground level and fed from the adjacent overhead line. An interesting supply is that to the Dyke Hotel, on the head near Devil's Dyke, and 600 ft. above Poynings. Catering, mostly for summer trade, at this hotel is responsible for a consumption of 14,000 kWh per year, and the equipment includes a cooker and a 7½-kW tea boiler.

We had expected to be able to refer to the influence of Brighton's popular holiday trading on the electricity supply, but from the broader viewpoint of mass catering in boarding houses the story is disappointing. The reasons given are that success with the larger non-domestic cooking installations necessitates a greater degree of uniformity in demand than is permitted by the rather precarious character of normal boarding-house trading. There are, however, a good many hotels which cater for a more permanent class of business where greater progress has been made.

At the Hotel Metropole, for instance, which was described to us as a community on its own with an engineer who can take full advantage of tariffs, there is a maximum demand of about 136 kW and a yearly consumption of 417,000 kWh. This hotel represents a recent conversion from private generation by steam at 115 V. Two transformers have been connected delta-delta to facilitate the new supply.

Perhaps catering for the visitor by way of amusements represents a bigger demand for electricity than living accommodation, although it seems equally precarious. S.S. *Brighton* did not achieve the anticipated popularity as a luxury bathing pool, and it is now an ice skating rink. A 2,000-kW Sulzer 11-kV electrode boiler operates in conjunction with three calorifiers, each serving a 30,000-gal. storage tank from which circulation for space heating throughout the building is effected. The larger degree of local heating required around the rink proper because of the cooling effect of the ice attaches to the installation a peculiar interest. Two 70-h.p. and one 105-h.p. Crompton Parkinson motors drive ammonia compressors in the refrigerating plant, while other energy-using equipment are the Alldays & Onions ventilating system, salt-water baths (heated from the boilers) and lighting. Supply is afforded on an off-peak basis between 10 p.m. and 7.30 a.m., and between 1.30 p.m. and 3.30 p.m. The maximum demand is 2,000 kW and the consumption for a year's operation as a skating rink was 1.97 million kWh, a figure considerably less than that for a corresponding period of operation of the premises as a swimming pool.

Brighton's latest holiday attraction is the new bathing pool at Black Rock, where there is an elaborate filtration and ozone treatment plant (Paterson Filter Co.) which deals continuously with the pool water, the whole 360,000-gal. content of the pool passing through the plant every four hours. So far the operation of the installation indicates a consumption of about 500 kWh per day. Water is pumped from the pool through sand filters to a 20,000-gal. tower into which bubbles of bacteria-destroying ozone are passed. The ozone is manufactured by passing air from the room through 4,000-V, 250-cycle discharges. The h.f. supply is afforded by a 20-h.p. Laurence Scott frequency-changing set, while for water circulation there are three C.P. motor-driven pumps, one of 25 h.p. which will complete the turn-over in four hours, and two of 12.5 h.p., each of which will do the same work in six hours. Allen West oil-immersed starters serve the pumps.

Electrical Benevolence

The Parkinson Committee

IT will be recalled that at the annual meeting of the Electrical Industries' Benevolent Association the president, Mr. Frank Parkinson, advanced a suggestion that an influential and representative committee should be set up to review the subject of benevolence in its relation to the electrical industry.

It is now announced that, at Mr. Parkinson's invitation, the following gentlemen have consented to act, together with Mr. Parkinson, as a Select Committee to consider generally the charitable requirements of employés in the electrical industry; the extent to which these requirements are at present being met; and what changes, if any, are required in order to deal more adequately than at present with such requirements: Lord Hirst, Sir Archibald Page, Mr. H. T. Young, president of the I.E.E., and Messrs. W. B. Woodhouse and Howard Marryat.

Among the matters which will be brought under review by the Committee are:—

1. The assessment of the charitable requirements of employés in the electrical industry and/or their dependants as regards: (i) Old age, (ii) physical disability, (iii) sickness, (iv) unemployment, (v) destitution.

2. The extent to which the above requirements are met by: (i) Existing individual employers' schemes, (ii) the schemes operated by associations of employers, (iii) schemes operated by associations of employés, (iv) schemes operated by existing charitable organisations within or available to the industry.

3. Whether it is desirable to seek to cover the above requirements for all workers in the industry by such means as: (i) Schemes to enable and encourage all employés to make some provision so as to reduce to a minimum the purely charitable claims, (ii) the extension, co-ordination or amalgamation of the existing charitable schemes (or some of them) to provide fully for the anticipated demands.

The work of the Committee will not necessarily be limited in its scope—the intention being that a thorough review shall be made.

In the course of the investigation the Committee will probably require certain information from those engaged in the electrical industry or in charitable work in relation to the industry, and it is hoped that the Committee will receive the full co-operation of all from whom it may seek such information.

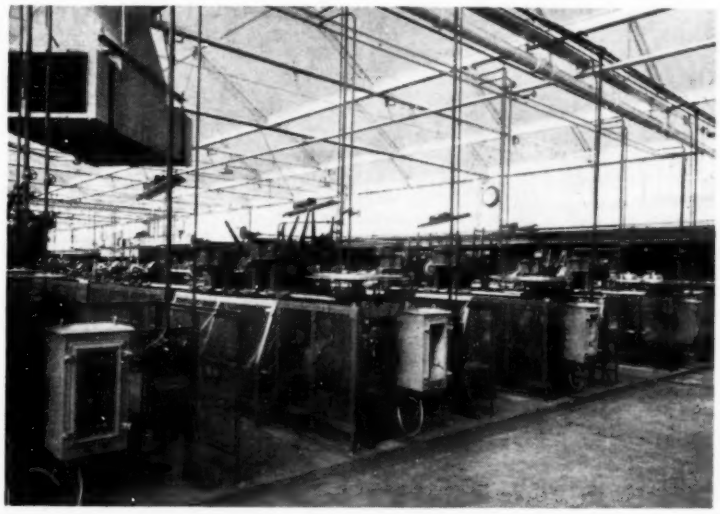
The Committee will be glad to receive any information which it may be thought will be of use in its consideration of the foregoing question, and for this purpose the address for communications will be: The Joint Secretaries, c/o Messrs. T. J. Wilson, Hunter & Co., Chartered Accountants, 59, Old Bailey, E.C.4.

Aspects of Power Factor Improvement. By S. Strode

THE widening use of kVA maximum demand tariffs is keeping the importance of power factor improvement in the forefront. One frequently hears the statement made that it is not worth while correcting beyond 0.9, or at the outside 0.95. This may be true in the case of transmission and distribution networks when the only considerations are the magnitudes of the currents in the lines and the operating characteristics of the system. It definitely is not true, however, in the case of a consumer paying £5 per kVA of maximum demand as the fixed portion of a two-part tariff.

Correction to high values

Assume a load of 500 kW corrected to 0.98 p.f. To effect the last step of this correction, *i.e.*, from 0.97 to 0.98 (the most costly step) requires 24 kVA of idle leading current and the load will be thereby reduced from 515.4 kVA to 510.2 kVA, a reduction of 5.2 kVA. If static condensers are employed, the cost of this last stage of correction will be about £38 and annual saving on the power bill £26. It is, therefore, a capital outlay which is recovered in less than eighteen months and which results in a saving of £26 per annum thereafter. I consider that under this tariff it is economic to correct to even 0.99. The cost of correcting the same load from 0.98 to 0.99 would be approximately £50 and the saving £25 per year. A capital outlay which shows a return of 50 per cent. is a sound investment. Maintenance of modern condensers may be almost ignored. If the consumer has his own sub-station some further slight saving would accrue from the reduction of transformer loss. Raising the p.f. from 0.95 to 0.99 decreases the current by just over 4 per cent. Copper loss being proportional to the square of the current, this loss would be reduced by 8 per cent. The full-load copper loss of a 500-kVA transformer is approximately 6.5 kW, 8 per cent. of which is 520 W. This is, therefore, another 0.5 kVA off the maximum demand and in the course of a year some 1,000 kWh would be saved.



A line of machines equipped with 9.5-kVA condensers

A further advantage is that the p.f. is more stable at high values. That is, a given amount of the idle current added to or removed from the load causes less change of p.f. at high values than at low. For example, if 500 kW at 0.99 p.f. were increased by and then decreased by 30 kVA of idle current it would cause the p.f. to change down to 0.98 and up to 0.997. The same load variation at an initial p.f. of 0.9 would cause the p.f. to change down to just below 0.88 and up to 0.92. This is a point of practical importance, as calculations are often based on the diversity factor commonly prevailing on the installation. Occasions arise, however, when there is less diversity than normally and these are the occasions which determine the reading of the maximum demand indicator. It is desirable, therefore, to guard against the kVA being still further increased by a fall in power factor at these times.

Method of Improvement

The devices most commonly used are static condensers, synchronous motors driving plant and synchronous motors running light. There are also a number of patent machines available for running in conjunction with slip-ring motors.

There appears to me to be no justification for ever using a synchronous motor running light, with the possible exception of really large machines taking upward of, say, 1,000 kVA of idle current. Machines of this size are somewhat cheaper than static condensers of the same capacity and the difference in price might be sufficient to compensate for the machine losses. Taking into account, however, the maintenance and chance of breakdown associated with a rotating machine with its commutator, slip-rings, brushes and bearings, its advantage is extremely doubtful. Smaller sizes are certainly not a sound proposition. The loss on a 350-kVA machine is about 18 kW, whereas the loss on a 350-kVA static condenser is about 1 kW and its price is about 25 per cent. lower. Further, the modern practice of independently fusing each small unit of a static condenser bank renders it is almost impossible for the whole bank suddenly to go out of commission. If one unit should fail it would merely be a small proportion of the whole and the remainder would continue to function. The defective unit could be replaced at an opportune time. With the rotating machine, however, if a mechanical or electrical failure occurs at any part of it, the whole machine is useless until the trouble has been repaired.

In one sense breakdown of p.f. corrective equipment is more serious than with any other apparatus. If a production machine is out of commission for a day it means one day's lost output from that machine, which, if necessary, can be made up when the machine is again in use. In the case of a consumer paying an annual kVA maximum-demand charge, if his p.f. corrective apparatus is out of use for a day (or even an hour during a full-load period) he might just as well be without the apparatus for the whole of that year.

The employment of synchronous motors for power drives can in certain circumstances be justified, but, in general, I think that a squirrel-cage or slip-ring motor with static condenser is a better choice. The efficiency of a self-starting synchronous motor operating at a leading p.f. is lower than that of a slip-ring machine of the same size and speed, and its price is higher than that of a slip-ring machine plus static condenser. The fact that the p.f. of the machine can be readily adjustable over a fairly wide range is an advantage. The most economical application is large sizes running at unity p.f., in which case their function is not to correct other load, but merely to avoid throwing further reactive kVA on the line. The most uneconomical application is a relatively small machine running at a low leading p.f. The cost of such a machine is approximately double that of a slip-ring motor and static condenser to take the same amount of leading current, and the losses are about 70 per cent. more than on the slip-ring motor and condenser at full load, and 100 per cent. more at half-load.

Size of Bank

If one large bank of condensers is employed its best position is connected direct to the main low-voltage bus-bars. This arrangement is subject to the disadvantage that cables on the outgoing side of the bus-bars do not receive the benefit of the reduction of current; on light loads the p.f. will go over to a leading low value, which at least is undesirable, if not impermissible. To a certain extent this trouble can be mitigated by switching off the condenser, or it may be subdivided and part switched out, but in either case careful attention is necessary to ensure that it is switched in again when needed. If the initial uncorrected p.f. is 0.66 and it is corrected to 0.99 the condenser kVA is equal to the corrected-load kVA, as shown in the vector diagram. The equation for equality of corrected-load kVA and condenser kVA is:—

$$I_\omega \tan \phi - I_\omega \tan 8^\circ 6' = \frac{I_\omega}{\cos 8^\circ 6'}$$

$$\tan \phi = \frac{1}{\cos 8^\circ 6'} + \tan 8^\circ 6'$$

$$= 1.1523$$

$$\phi = 49^\circ 3' \qquad \cos 49^\circ 3' = 0.66 \text{ (approx.)}$$

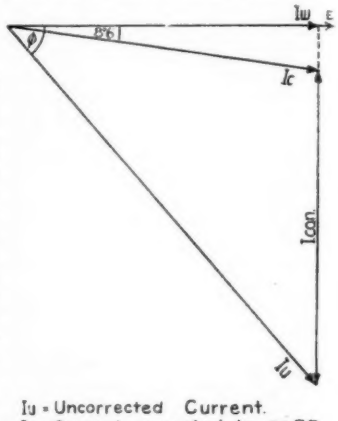
It follows, therefore, that if the initial p.f. is less than 0.66 and it is corrected to 0.99 the condenser kVA is greater than the load kVA; and if the full amount of condenser capacity is left in circuit without load it will result in an increased maximum-demand record.

The alternative of employing a few not so large condenser banks at strategic points on the installation has the advantage of relieving (of unnecessary current) the cables up to the

condenser positions. One is left, however, with the difficulty of maintaining the p.f. within reasonable limits.

The third choice of many small condensers has much to recommend it. If all the larger-size motors have individual condensers (in circuit only when the motor is running) and a few others are employed for the common correction of all the small motors in groups the total amount of condenser capacity on the line will be always roughly proportional to the load. This is of particular importance on those chance occasions when almost everything happens to be "on" at the same time. The requisite additional condensers also are automatically switched on to meet the conditions. If direct-starting squirrel-cage motors are employed their starting currents are usefully lessened by the use of individual condensers and may result in the current drawn from the line being reduced from six times normal to five and a half times. This is not a large decrease, but (heating being proportional to the square of the current) the heating in the circuit is reduced from 36 to 30 times normal, which materially lessens the chance of blowing a given size of fuse at the moment of starting. Further, with this scheme all cables, distribution boards and switches carry rather smaller currents than they otherwise would do. A point against the use of many small condensers is that the total installed capacity is somewhat more than would be the case if a few large units were employed, the capacity of which would be determined after allowing for some diversity factor. This additional expense is partially offset by the fact that the price per kVA of condenser is rather less in small units than in large. When it is remembered that on some rare occasions every condenser may be in circuit at the same time, at which time they are doing extremely good service, I feel that this additional expense is not an extravagance.

The new factory of Gillette Industries, Ltd., already described in the ELECTRICAL REVIEW (February 5th, 1937, page 195), has a p.f. improvement installation designed on the lines which I have indicated. This works is divided electrically into three portions. Every motor of 10 h.p. and over has its own condenser of a size to correct to 0.98 at full load. Two main distribution boards have Dubilier condensers of 50 kVA and 28.5 kVA, respectively, calculated to correct to 0.98 collectively the motors of less than 10 h.p. associated with those boards. The remaining main board derives its correction from a Crompton Parkinson 70 h-p. auto-synchronous motor designed to operate at any p.f. between 1 and 0.85 leading at full load. Two of these motors are installed for driving compressors, but one is a standby set at the present time.



Iu = Uncorrected Current.
Ic = Current corrected to .99 P.F.
Iw = In-phase component of current.
Icon-Condenser current.

Vector diagram

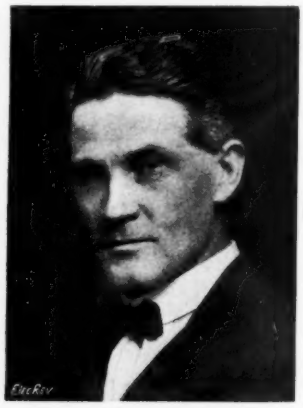
On peak load the p.f. of the whole system is 0.99 on the high-voltage side. During the working day the load fluctuates down to 55 per cent. of full load owing to the fact that all workpeople (in relays) have a morning and afternoon break. The p.f. throughout the day is always between 0.98 and a trifle over 0.99.

Initiative in the Electrical Industry. By H. Trencham

Isolation or co-operation?

INDIVIDUAL initiative and effort will always be the sources from which changes are derived, but their ultimate value will be strictly in accordance with the measure of rational control exercised in shaping them to the needs of the community as a whole.

The comparative youth of the electrical industry and the rapidity of its development in recent years may account for the disquieting fact that this truth, as applying to users and manufacturers of electrical apparatus, is passing unrecognised or disregarded. It is the purpose of these notes to draw attention to the need for a closer co-operation between these two groups and a better mutual understanding of their difficulties and problems. Written from the manufacturer's viewpoint, the comments may possibly appear in some measure unfair to the user, but if so, this can only serve to emphasise the need which is indicated.



Mr. H. Trencham, M.Inst.C.E., M.I.E.E., is consulting switchgear engineer to the British Thomson-Houston Co.

The problems associated with electric power supply are almost countless in number and many of the most important of them are of a nature which involves both maker and user. While it is obvious that the best and quickest road to their solution must lie in the direction of mutual understanding and a co-ordination of effort by both parties to these problems, there is, unfortunately, no regular channel of interchange of views and opinions between them whereby details of difficulties and problems can be communicated and discussed, the lines of desired progress explored and their possibilities appraised.

It is true we have our Institution with its papers and discussions, but this activity, being conducted under the public eye, does not afford the scope nor does it permit the frankness necessary for the object in mind. Some closer personal contacts are established when discussing and drafting Standard Specifications in the British Standards Institution, but here the main object in view would be either completely sacrificed or indefinitely delayed by the exploration of difficulties or the forecasting of future possibilities.

There are instances wherein a fairly close approach has been made between isolated individuals or separate organisations, but these cases are the exception rather than the rule and the benefit from them is special rather than general. The rule, indeed, appears to operate rather in the other direction and there is frequently evident a feeling of definite distrust, in some cases amounting almost to antagonism. This, unfortunately, is not confined to any relatively unimportant sections of the industry.

Not Utopian

The idea of mutual help and co-operation is neither fanciful nor Utopian, but has already found actual embodiment in countries other than our own with a degree of benefit very well worth the effort which brought it into being, and holding sufficient promise of continuation and expansion to warrant an extension of past endeavours.

It might come as a surprise to many British engineers could they realise to what extent solutions of their own problems have been aided from abroad by concerted efforts of manufacturers and users, the like of which appear to have been regarded as impossible or not worth while striving for in our own country. With an adequate realisation of the need for, and an appreciation of, the possible benefits to be derived from a close association between production and utilisation of electrical apparatus there can be no doubt that the collective will to effect such an association would not be lacking.

For a number of years I have been connected with the switchgear industry, and naturally the details which apply to this activity are those which come most readily to my mind in discussing the subject.

As already indicated, the scope of common interest is very wide, but it may lend greater point to the contention if some of the ground is examined in detail and, for the reason given, this is chosen from amongst matters appertaining to switchgear. The circuit-breaker as the characteristic device of a switchgear equipment may appropriately be chosen to yield typical examples. These are, however, of much wider general application and are merely representative of their class.

In the rating of circuit-breakers the principal items are voltage, current, and breaking capacity. Voltage rating involves predesigned insulation level and the appropriate tests to prove adequacy. That which is adequate for, say, a cable system serving a dense load may be badly insufficient for an overhead line passing through country subject to lightning storms. The insulation safety factor which is economically sound on a small type of breaker for extensive industrial application may give an insufficient margin of safety if applied to major power station switchgear.

What is the correct insulation level to adopt for any given

standard breaker, and how is it arrived at? Should the relationships between service voltage and insulation flash-over voltage at normal frequency and impulse conditions be similar in different classes of circuit-breakers? Whose responsibility is it to determine what is suitable for these various cases, and whence is the information to be derived on which to base decisions?

It cannot be said that the problems involved lie within the province of the maker or user alone, neither are the data bearing on them necessarily in the possession solely of one or the other; yet this factor of insulation level alone will influence the cost of the article eventually produced to quite a large extent and it is clearly in the interests of both that a sound economical price be arrived at.

Current and voltage ratings are arranged in simple steps, as few in number as can conveniently meet requirements. The actual ratings called for will be settled by the capacity or load of the apparatus to be served. The cost of production increases rapidly with increase in current and voltage. Breaking capacity in its turn is related to voltage and plant capacity, and again a number of steps or frame sizes exists. There are economic limits to increases in breaking capacity beyond which there is greater difficulty in advancing by one step at a given voltage than advancing by the same step and increasing one step in voltage at the same time. There is a value of breaking current beyond which the difficulties in making and breaking faults are enormously increased.

To what extent are these facts appreciated and taken into cognisance in system planning and in the selection or application of circuit-breakers, and who is interested to know that ratings chosen will not produce freak designs whose costs are far more than for ratings more rationally chosen?

Compare the following table of maximum ratings of a Continental and a British switchgear manufacturer imposed upon them by their respective markets.

Voltage in kV	Continental gas blast breaker max. std. breaking capacity		British oil breakers max. std. breaking capacity	
	MVA	Amperes	MVA	Amperes
6.6	500	44,000	1,000	87,500
10/11	800	46,000	1,500	52,000
20/22	800	23,600	1,500	39,400
30/33	800	15,300	1,500	26,000

Is it out of place to suggest that the development and manufacturing costs of the one are necessarily on a higher level than the other?

Tendency to Look Abroad

The British user would be justifiably annoyed were it suggested that he is prepared to place his easier and more profitable business with the foreigner and reserve the more onerous and difficult tasks for his home manufacturer. There is evidence, however, of a tendency on the part of some British users to look abroad. Surely such a position could only be brought about by lack of knowledge of the true situation. Probably the lack of knowledge includes an inability even to answer the question whether the foreign manufacturer is actually able to cope with the more difficult demands.

Let us carry our circuit-breaker inquiry a step further. It is naturally desired to prove that circuit-breakers are capable of interrupting the faults for which they are rated, and tests are asked for and also margins of safety. The bigger the margin the more comfortable will be the mind of the operating engineer.

What is the duty cycle which may be held to represent requirements, and does the duty cycle which is correctly applicable to an overhead-line system also apply for a breaker which is used in feeding a cable system or a generator? The duty cycles adopted in standard specifications originated in American and Continental practice, where overhead lines, especially for the high-voltage systems, are much more usual than cables.

The possibility of improved service by instantaneous reclosure of a circuit-breaker after it has tripped out on fault, such as, for example, a transient flash-over on an overhead line, appeared to be a suitable means of improving operating service. The proof of this point necessitated a long series of tests wherein manufacturers and users in the United States* co-operated in a striking manner.

The experience of the user as to the actual need is a far more valuable guide than the ideas of the designer and tester, but it needs the experience of both to arrive at a solution which will represent a true economic balance.

What is the circuit severity of the tests which should be imposed on circuit-breakers to ensure that they will be adequate to meet the demands in service? The manufacturer has provided test plants capable of giving very severe conditions, along with instruments capable of showing and recording these conditions, but he is unable to supply information on the actual demands of practice. This can be got from power systems alone. The significance of variation in rate of rise of restriking voltage was amply demonstrated in a series of tests at Philo in, U.S.A.,* wherein the operating company altered the circuit constants so as to provide a wide range of variation bringing about corresponding changes in circuit-breaker performance. The variations applying to these tests might, however, be typical of the particular system involved only and it is, therefore, now proposed by certain operating companies in the U.S.A. to find out and supply typical information concerning a number of their system restriking voltages. Doubtless if and when it is published we may be able to profit by this information.

Selection and Replacement

Another interesting phase of the technique applying to circuit-breakers is their selection and application to power systems. At one time it was held that economic pressure precluded the possibility of applying at all parts of a system circuit-breakers which would be able to interrupt the maximum possible short-circuit at their points of application, and there are very many circuit-breakers in operation to which this condition applies. Experience of breakdowns has not produced any crises which actually dictate the pursuit of a safer course, but prudence and the increasing penalty of breakdown has produced a definite tendency to replace old breakers.

The manufacturer's test plant has enabled him to provide a manifold increase of interrupting capacity in a given space and the wise application of knowledge available may be instrumental in saving immense sums of money. How far should the policy of replacing old breakers be pushed and whence is to come safe guidance in making decisions unless from the joint efforts of all the interested parties?

Our study of circuit-breakers could be extended very much further and include such matter as types of circuit-breakers and their multitudinous embodiments of different classes of equipment, their location and method of installation and connection, &c., but this can hardly be necessary.

Reference is frequently made to high costs, but it should be remembered that the manufacturers, to a large extent and at their own cost, have had to find their own solutions to most of the important problems which have been met. Many of these problems being two sided it follows that the results are not necessarily those most economical to the industry. The amount of money spent, however, is certainly very good evidence of an honesty of purpose which is deserving of praise rather than censure.

Potential Saving from Co-operation

A close and combined study of the joint difficulties of manufacturers and users can be seen to have before it a very wide field of potential saving, but, though the will to effect such savings undoubtedly exists individually, the means to give it effect are lacking. The engineers of competing manufacturers are able to meet in technical committees and discuss technical and manufacturing issues, and the personal contacts so established have brought about a mutual trust and esteem which, to mention one instance only, enabled the representatives of Great Britain to play a major constructive part in securing agreement on an international specification for circuit-breaker rating and performance.

A pertinent question therefore suggests itself:—Can we not find a constitution and terms of reference whereby such committees or their essential elements can combine with their opposite numbers in the operating field to study common problems and settle common policy? There can be no possible doubt as to the issue if such contacts could once be established. Subject matter suitable for consideration by such committees could be found in plenty. One suggestion as touching switchgear is given by way of example:—

Is it possible to envisage uniformity of requirement for 11-kV distribution switchgear in respect of any or all of the following:—Circuit-breaker interrupting capacity; bus-bar capacity; feeder and transformer circuit capacities; arrangement of switchboards as to single bus-bars with bus sections or duplicate bus-bars and, if the latter, on-load or off-load change-over, and typical instruments and instrument transformer equipment? To me it appears that any general agreement in respect of these features would offer immense economical advantages and might materially assist in settling some of the problems of economical distribution.

* See *i.a.* "Ultra-High-Speed Reclosing of High-Voltage Transmission Lines," Philip Sporn and D. C. Prince.—*Electrical Engineering* (official organ of the American I.E.E.), January, 1937.

*See "Circuit-Breaker Tests—Philo 1930." Philip Sporn and Harry P. St. Clair, A.I.E.E. Winter Convention, January, 1931.

Personnel Problems in Industry

Finding and training the right men

THE first of the series of Studd Management Lectures was delivered on Friday last at the Polytechnic, Regent Street, W.1, by Mr. M. J. Railing (vice-chairman and joint managing director of the General Electric Co., Ltd.), whose subject was "Personnel Problems in Industrial Concerns."

Mr. Railing began by giving some idea of the scope of the industry with which he had been associated for the last forty-seven years. He pointed out that the rapid development, employing over a thousand millions of capital, had happened within the span of one lifetime, and during that short space of time the right personnel had had to be found and trained. He contrasted the difficulties of the pioneers, when the sum of electrical knowledge could be grasped by one brain and there were hardly any text-books and no mathematical or electrical formulæ to guide designers, with the conditions prevailing to-day.

[*Elliott & Fry.*
Mr. M. J. Railing, vice-chairman and joint managing director of the G.E.C.

The aggregate subscribed capital in shares, debentures and loans of electricity undertakings in 1897 was £68,000,000; in 1936 it amounted to a grand total of over a thousand millions. On the supply side alone during those years the capital issued had risen from 6¼ millions to over 230 millions and units sold per annum from 43 millions to over 15,000 millions.

In the selection of employés for such a highly specialised industry a number of points had to be taken into consideration. Certain kinds of workmen tended to congregate in certain definite districts and it was necessary to give some attention to site when contemplating the erection of a works. Specialised localities formed rough training grounds for many types of men, and their needs, in the course of years, had brought into being technical schools, colleges and institutions.

Dealing with the production side, he said that the selection of employés for work demanding only a minimum of responsibility and initiative presented no serious difficulties, but more care was needed in obtaining the skilled labour which formed the backbone of a successful factory or group of factories, as here not only the acquired and proved facility of a man had to be included, but also his mental flexibility.

The Technical Staff

With regard to the technical staff, the days when one man could be expert in all technical matters passed long ago, and to-day it was the work of almost a lifetime to become an authority in any single branch of the industry. On the technical staff depended the satisfactory output of an industry, and, on occasion, the actual safety of the many operations in progress. Fortunately, many admirable institutions existed where men of right calibre could receive a first-class training. One of the best sources of the technical staff was the ranks of the skilled workers themselves, and when some reinforcement of the technical staff was needed it was from this source that their best helpers and advisers on the technical side were often found. Such men were familiar with the general policy of the firm and could be relied upon to act in accordance with "the spirit of the company," a quality which could only come after years spent in its service.

The first essential in sales personnel was a thorough knowledge of the goods. They must be men of education, able to speak well, equipped with humour, tact and good temper, and, above all, students of human nature. The salesman, the commercial traveller, was the spearhead of trade and must have the entire support and confidence of his chief, sales manager and directors. Members of the sales personnel came into touch with their public, the wholesalers and distributors, and had therefore unrivalled opportunities for building up an industry's good name. A sales staff should have a thorough grounding in all aspects of the business bearing on their own field, so that they would obtain a general knowledge not only of the particular products it might be their duty to sell, but of others that might come into relation with it.

Dealing with the administrative staff, the industry must have men with special gifts of control. While these might occasionally be obtained from outside sources, the best and most-trusted members of an administrative staff were those who grew up from within the firm itself to hold these senior positions.

In providing a supply of technical and skilled personnel, apprenticeship schemes played an important part. There was the "artisan apprenticeship" type of course, under which boys from fourteen years of age were bound to remain at a works for five years. Other apprenticeship courses covered first-class apprenticeships and trade apprenticeships. In the first-class apprenticeship courses premium pupils were received for a period of not less than three years, while in the trade-apprenticeship class applicants of not less than sixteen years were taken for a period of at least four years without premium. For the past fifteen years the G.E.C. had adopted "products classes," which were open to all junior members of the sales and clerical staff and were based on a two-years' curriculum, the foundation of which was the company's catalogue. Examination papers for first- and second-year students were set, and conducted tours of all their manufacturing centres were arranged for those who reached a certain minimum standard. An enlightened and thoughtful management could do an inestimable amount of good by giving facilities, for instance, for the formation of technical groups among its workpeople.

Administrative Posts

With regard to the training of the administrative staff, he believed that the successful administrator was born, not made, and it was part of the task of the employer to recognise these men when he saw them and to give them every chance to prove themselves in positions of gradually increasing responsibility. To provide one source of supply of men who might qualify later for administrative posts his company had a trainee scheme, under which men were taken from the public schools or universities and for the first two years were given a thorough grounding in the details of their business.

In any industry with reactions all over the world it was important to find men of ability who could take charge of overseas ramifications. An instance of steps to achieve this was an overseas post-graduate engineering course primarily intended for students who had secured a technical degree at an overseas university and desired to gain practical knowledge in the workshop.

With regard to promotion and remuneration, the principle of giving juniors a regular and periodical increase in salary was a wise one and was, in practice, well repaid, while when the opportunity for promotion arose a vacancy should be filled by promoting a member of one's own staff, other things being equal. Head office and branches should be one, and in any large organisation some system of recording men who had shown promise was essential.

All employers to-day knew the vital importance of encouraging the social side, making not only for the preservation of the status of labour, but also for its happiness. Expenditure on social activities was always well repaid, as was also the provision of canteens where the staff could take meals in pleasant surroundings. In all large industrial concerns there were schemes for providing sick pay, death benefits and pensions. It was the essence of all such schemes that they should be run and managed by the employés themselves, with only a benevolent and helping hand from the management. Several pension schemes were available through the large insurance offices, but there was much to be said for a company administering its own scheme when it was sufficiently large to do this.

Contact with Employés

Mr. Railing said that, despite this mechanical age, he still adhered to the principle that in any organisation the study of human nature was essential and was repaid time and time again. The maintenance of a close personal contact with all sections of the staff and workpeople could be accomplished if the management was imbued with the proper outlook. As a desire to cultivate mutual understanding he had for many years arranged once a month to see all new members of their head office staff, except the most junior.

Many people questioned whether the younger generation worked as hard as previous generations. Personally, he felt that the young generation of to-day did work hard, and that often the reason behind such a question was to be found in the fact that the modern employer had lost that personal contact which was possible in a more slow-moving age. The elementary, secondary and public schools, the technical colleges and the universities were turning out many men of good type. The professions continued to attract those of a certain outlook, but industry to-day appealed more than ever before.

The Paris Fair

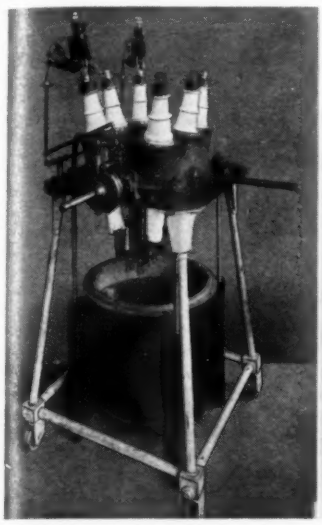
A review of the electrical exhibits

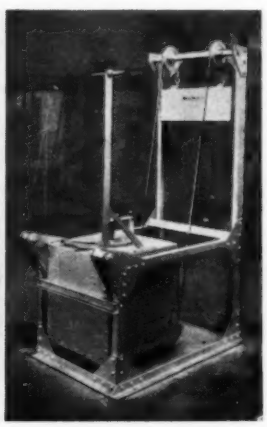
IN spite of a series of unfavourable circumstances the Paris Fair this year has an electrical section of especial interest. If there is little entirely new equipment, there are numerous developments and improvements, this being due largely to the fact that in the past year manufacturers have been somewhat hampered by the general conditions in France and by the fact that special material for the International Exhibition, which opened only two days after the Fair, has taken up a great deal of their time.

An outstanding feature of the industrial section is the stand of the Société pour le Developpement des Applications de l'Electricité arranged in the form of a typical small shop for the heat treatment of metals, including a series of eleven machines of various makes. Simplicity of operation is the principal aim of the latest types of apparatus. A new Ugine Infra induction furnace for the melting of Babbit metal has the induction winding, the secondary (consisting of a cylinder in stainless steel), and the magnetic core made of a special alloy, arranged around the graphite crucible. Sheets of metal around the exterior enclose the magnetic flux and strengthen the construction. A pyrometer couple located permanently in the crucible permits regulation of the temperature. The furnace, which has a rating of 4 kW and consumes 135 kWh per ton of metal, can be tipped for pouring and is counterweighted.

Among welding machines shown, most of which are spot welders, is a new Languepin spot welder with pneumatic control. In this machine the equipment is enclosed in a welded case designed to permit the doors to be folded up in sections, thus reducing the amount of space occupied. A glass window in the side of the case permits the operation of the machine to be observed without difficulty.

Smaller industrial equipment includes an extension of the range of moderate sized oil switches which the Electro-Mécanique is showing. These are built on the same principle as its large high rupturing capacity switches, but are smaller and are intended for rupturing capacities of from 3,000 to 8,500 A and voltages of from 3,500 to 15,000 V. Small mercury circuit-breakers designed for high precision work are now produced by the Société des Recherches et Perfectionnements Industrielles for currents of from 1 to 20 A, at 110 or 220 V.





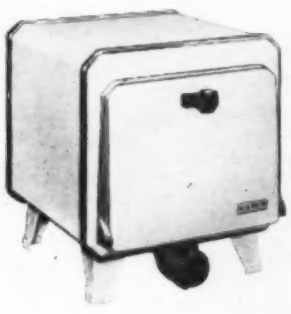
An Electro-Mécanique oil switch for small rupturing capacities, a Languepin welding machine and a Ugine Infra furnace for melting Babbit metal

Many new types of electric motors make their appearance, due largely to the fact that special models formerly imported are now being made to a much greater extent in France. Some French manufacturers are making motors under foreign licences, as, for example, Ragonot, who are showing a series of French-made motors on the lines of the Delco machines.

In the domestic section, although the exhibits are numerous, there is a tendency to concentrate on certain articles. Refrigerators, largely of American make or design, are being "pushed" and models shown are of a moderately large size—a contrast to the very small ones favoured in previous years. An exception is the small Elektrolux, which can be attached to the wall. In a novel arrangement of the Fresco machine the refrigerator is built into one side of a table, which extends beyond the edge in order to produce a table of convenient size for a kitchen.

Electric cookers and hot plates show little change, but designs have been simplified and modernised, and for the first time a widespread use of colour is noticeable. This applies also to domestic appliances generally, finishes being available to match the colour scheme of a kitchen.

A novel feature of the Selful iron is a special contact at the back which permits it to be plugged into a stand instead of being attached to a cord. A thermostat regulates the temperature to within about 10 deg. and a small signal lamp indicates when the desired temperature has been reached.



Arthur Martin electric hot-plate combination and a small Alsthom oven

Power Station Emissions

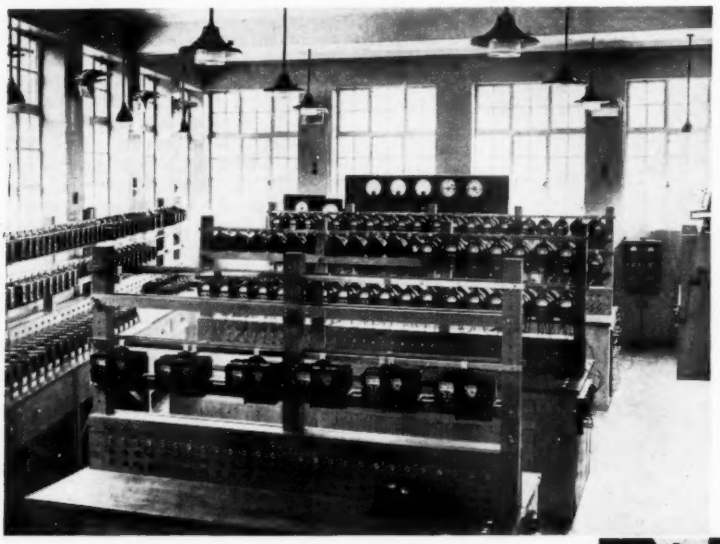
THE seventy-third annual Report on Alkali Works (Stationery Office, 1s.) refers to the results obtained in 1936 with the gas washing plant installed at Battersea power station. The total weight of coal fired was 430,887 tons, having an average sulphur content of 0.91 per cent., while the total volume of gas treated amounted to 200 thousand million cu. ft. (dry at n.t.p.), and the maximum load on the gas washer to 35 million cu. ft. per hour. With an average sulphur emission (1898 works tests) of 0.025 grain (as S.) per cu. ft. of dry gas at n.t.p. the equivalent of sulphur eliminated by gas washing worked out at 3,611 tons. At the Fulham Corporation's new power station, which was officially opened on September 26th, a separate Howden-I.C.I. gas-washing plant has been installed for each boiler, each unit being in two sections. There is no liquid effluent. The sulphur equivalent in the chimney gases has been reduced to less than 0.01 grain per cu. ft. A similar process is used at the Tir John power station, Swansea, where pulverised anthracite duff is burned. Although the character of the fuel used has created some practical difficulty, the efficiency of the washing process is stated to be unquestioned.

The Electricity Commissioners' consent to the construction of the new power station at Stone, near Dartford, was conditional on the use of the most efficient methods practicable for the elimination of smoke and grit. It is understood that cyclones will be used with the stoker-fired boilers and electrical precipitation with the pulverised-fuel boilers. The layout of the station will permit of the installation of plant for preventing the emission of sulphur compounds if required by the Electricity Commissioners.

Meter Testing at Hornsey

DURING the relatively short while that Mr. F. C. Orchard has been borough electrical engineer and manager at Hornsey he has lost no time in providing the Council's Electricity Department with an a.c. meter-testing laboratory which is believed to be one of the most up to date of its kind in the London area.

The new one-storey building has a polished teak block floor, under which is a trench system with removable teak covers. In this way the connecting cables are neatly accessible. The polished oak test benches have wide table tops with ample cupboard and drawer accommodation below. Down the centre



[*Elec. Rev. photos.*

General view of the meter-testing laboratory, and (right) supply panels with instrument cabinet in the corner

of the room there are three double-sided benches with liberal gangway space, while six single-sided benches are placed end-on right along one side wall. Along the opposite wall are a single-sided test bench, an instrument cabinet and a small office.

All these benches are equipped with three-phase, four-wire potential circuits, connections being made by means of sunk bakelite sockets in phase colours specially made to the Department's design. These sockets are mounted on longitudinal teak boards and connected to copper bus-bars neatly concealed. The plugs are also in phase colours, with a unique arrangement in the plug heads for securing the flexible-cord connection to the meter potential coils. The testing current from the "supply" equipment is passed to a plug panel which enables three phases to be plugged simultaneously to (*a*) the instrument cabinet, or (*b*) the largest double-sided polyphase bench, or (*c*) any single-phase testing bench. The current cables from this plug panel are brought to a terminal board mounted on the end of each bench, provision being made for the tester to make and break the circuit rapidly by means of an Allen West contactor switch that is also very useful for "inching."

Meters are suspended on sliding hooks fitted on stainless-steel rails above the plug boards vertically over the bench tops. Thus the maximum number of meters of differing dimensions can be accommodated, with provision for testing simultaneously 350 single-phase meters. Alternatively, the polyphase bench can cope with 16 three-phase, four-wire, or 24 three-phase, three-wire whole current meters up to 100-A capacity, or five metering equipments up to 500-A capacity.

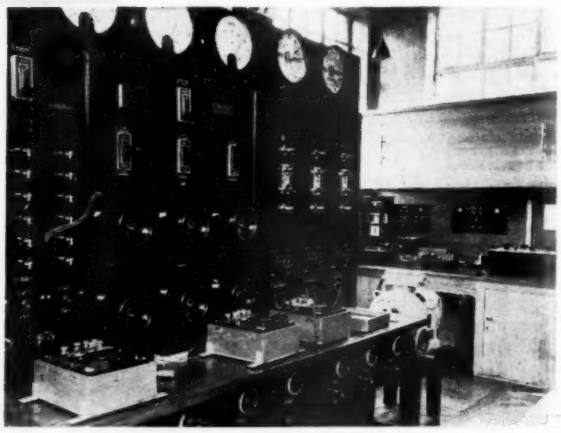
The "supply" equipment consists of a Metropolitan-Vickers 2-kVA meter panel with a capacity of 0/500 A at 0/600 V and suitable for three-phase, four-wire testing. This panel is fed from a motor alternator driven from the d.c. system and giving a three-phase, four-wire a.c. output of 5 kVA at 230/400 V, 50 cycles. Later on an independent source of a.c. will be available. The frequency is variable from 47.5 to 52.5 cycles per second.

The panel is of the "dead-fronted" type, with the exception of the heavy-current paralleling links, which are not dangerous. There are three separate circuits for voltage control, current control and starting-current arrangements. The voltage circuit consists of a phase shifter and a set of three voltage transformers, each arranged with graded secondary windings. Voltage selection from zero to 600 V is effected by means of tumbler switches. An extra secondary winding is connected in each phase with a potentiometer to provide a very fine regulation. Each transformer is of 500 VA and capable of supplying a large number of meters at one time. Three three-range voltmeters with selector switches are so arranged that any potential (phase to neutral, or phase to phase) can be measured. The phase shifter enables any power factor from zero lead through unity to zero lag to be obtained. Two power-factor indicators are fitted, one for single-phase and the other for polyphase testing.

Control of the 2-kVA current output (500 A at 4 V) is effected by means of tapped auto-transformers which feed the primary windings of the multi-range current transformers. "Battery" type selector switches fitted with anti-arcing resistances are used for coarse and moderately fine adjustments, while fine control of each phase is obtained by bridging with a potentiometer rheostat an extra winding on the auto-transformers. A further winding on each of the three auto-transformers is bridged by a potentiometer rheostat and gang operated by one control wheel. This gives extremely fine control of all phases simultaneously from zero to maximum output.

The testing transformers are arranged in two banks of three (two per phase). One supplies up to 100 A at 5 V (500 VA) and the other up to 500 A at 4 V (2 kVA), thus allowing, with suitable connections, for five 500-A meters to be tested together.

Multi-range selection is provided on the 500-VA testing transformer by means of "pull-turn-push" selector switches and on the 2-kVA testing transformers by means of links. The range of the indicating instruments is adjusted automatically with the change of range of the transformers. Variable chokes, complete with short-circuiting switches, are inserted in the primary winding of the



testing transformers to obtain some individual control of power-factor adjustment. Thus any slight phase angle displacement in the various transformers and the phase shifter can be corrected.

To enable 2.5-, 5- and 10-A meters to be tested for starting current fixed resistances are so connected to terminals as to make it possible to start-test a batch of meters while another batch is undergoing routine tests.

Class A sub-standard multi-range instrument current transformers are "built in" and have 5-A secondary windings. Two types are used per phase, one of the bar primary type on the 2-kVA testing transformer, while a wound primary type is used in conjunction with the 500-VA testing transformer. Connections are so arranged that automatic selection is obtained for the appropriate sub-standard current transformer secondary winding, and here again it is possible to obtain the complete range from zero to maximum current on the sub-standard instruments without having to change any connections.

Range change of the testing transformers is made by means of the "pull-turn-push" selector switches, or links, automatically changing the range of the instrument current transformers as in the case of the indicating instruments. Any phase or combination of phases can be used for single-phase testing. The instruments mounted on the "supply" panel are intended to serve as indicators only, but ample provision has been made for precision testing with suitable sub-standard instruments.

All the laboratory "standards" (used for checking testing instruments) are housed in a cabinet with a folding top which

Correspondence

Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

Checking Two-part Tariff Meters

One of my technical assistants has hit upon what I think is an easy and practical method of checking the fixed-charge portion of two-part tariff prepayment meters, when a large number is being tested. I feel that the testing of the rental part of the meter is just as important as the kWh test. We thought of several schemes, but they invariably needed the whole-time attention of a tester or an individual mechanical check, which proved too costly in time spent and interference with the ordinary routine testing. The arrangement for checking that we have found to be successful is as follows:—

Among some old junk we found an a.c. bell and a 2-mf condenser. From the diagram of connections it will be seen that, when the prepayment switch opens, the bell rings and calls the attention of the tester engaged elsewhere in the department to come along and cut out from the batch under test the meters whose switches have opened. These meters are easily found as they all have some indicator to show coins in arrears or credit.

Of course, I must admit that we were very lucky to have found the right values of inductance and capacitance (without making any measurements of their values) that enabled the small quantity of current to actuate the bell when they were put in series by the opening of the prepayment switch. The condenser current is not enough to turn the discs when all the switches are closed. The only work entailed is the usual connecting up of meters; no covers need be removed, nor need the meters be interfered with in any way. One should arrange the switches to open during working hours.

I think this article may be of some use to other undertakings where these meters have to be tested.

London, S.W.1, *May 20th.* S. HUNT, A.M.I.E.E.
Meter Superintendent,
London Associated Electricity Undertakings, Ltd.

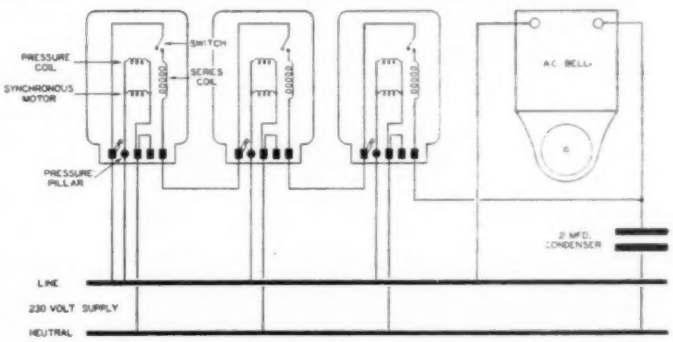


Diagram of circuit for testing rent-collecting devices in prepayment meters. Any number of meters can be connected in this way.

Off-peak Supplies

In reply to Mr. E. M. Ackery's query in your issue of May 14th the output is greater in the case of the coke-fired system owing to the method of operation. In this type of installation operation is variable and dependent upon the human element; this results in extra, unavoidable losses in order to satisfy a specified requirement, and the output, therefore, is increased by a corresponding amount. In an electrical system, with automatic control, losses from this cause are avoided, and this is one of the most important advantages of this method.

Winchester, *May 22nd.* J. F. ELPHICK.

Transformer Standards

My attention has been called to the interesting article in your issue of May 7th on "Standard Transformers. Experience with B.S.S. No. 171-1936." One or two statements in that article, however, may perhaps be a little misleading to the reader.

In the first place, in B.S.S. No. 171 there is no reference to B.S.S. 355. The appropriate revision of B.S.S. 355 is at present in hand, which will bring that specification up to date as a separate entity.

Your contributor mentions other countries with which B.S.S. 171 now lines up on the question of temperature rise, but he omits to mention the important fact that these temperature rises are in accordance with the international rules for electrical machinery, *i.e.*, Publication No. 34 of the International Electrotechnical Commission. Incidentally, in this paragraph (at the bottom of the first column) there is a serious misprint: the temperature rise difference between the windings and oil, given as 50 deg. C., should read 5 deg. C.

On the question of the new definition of "ambient temperature," the author's statement that "the values which are now specified are somewhat indeterminate" does not appear to present the case quite fairly. Actually the new definition of ambient temperature involving a maximum and daily average would appear to be quite specific and to correspond much more closely with actual operating conditions than did the old single maximum figure of 40 deg. C.

With reference to the last paragraph of the article the preparation of standard rules for impulse tests has, we understand, advanced a long way, and we learn that proposals will be submitted by the manufacturers to the B.S.I. in the not too distant future.

Further, may I call your attention to an error in the opening paragraph, which is also repeated in your leaderette, where it is stated that the previous edition of the specification was B.S.S. 72 of 1927. Actually it was B.S.S. 171 of 1927.

J. F. STANLEY,
Electrical Section,
British Standards Institution.

London, S.W.1, *May 19th.*

[The author of the article was not responsible for the incorrect number given to the previous edition of the Specification, or, of course, for the misprint referred to.—EDS. ELEC. REV.]

Static Electricity

With reference to Mr. S. J. Fleming's letter in your issue of April 16th, the static sparks he gets are obviously generated by the rubbing of his leather shoes on the carpet. I suggest he should try sprinkling some water on the carpet or wetting the bottom of his shoes. The effect will then disappear.

In this country, where houses are heated to 70 deg. F. or more and humidity can be very low in the winter, the conditions are often ideal for generating static electricity. A little

Meter Testing at Hornsey (*Concluded from previous page*)

can be locked when not in use. The "local primary" and "local" standards are Tinsley vernier potentiometers with 500-V ratio boxes and 5-, 30- and 150-A shunts. The local sub-standard is made up of one Drysdale (Model OB.2) two-element wattmeter with ranges of 0.5, 1, 1.5 and 5 A and 250 and 400 V; three Weston (Model 310) single-element wattmeters with ranges of 2.5 and 5 A normal (5 and 10 A maximum) and 150 and 300 V normal (250 and 400 V maximum); one Weston (Model 370) ammeter of 2.5 and 5 A; and one Weston (Model 341) voltmeter of 300 and 600 V.

All the "standard" and "sub-standard" instruments and the built-in precision transformers have been checked at the National Physical Laboratory. The current and voltage for locally checking the accuracy of these instruments are obtained respectively by tapping the battery (which serves the old d.c. meter test-room) and the 480-V mains. Fine-control Zenith rheostats in both current and potential circuits provide the necessary smooth adjustment of instrument readings.

Two methods of testing kWh meters are in use. Polyphase whole-current meters and metering equipments are compared with the aid of a stop-watch with a polyphase Drysdale wattmeter. Single-phase house-service types are tested against a multi-range Metropolitan-Vickers single-phase Wh meter having a graduated dial. There are three ways of doing this: (*a*) By means of a tapping key controlling both the current and potential of the testing circuit. The standard meter is allowed to rotate x revolutions, the angular displacement from zero of each test-meter disc being then read on a gauge which gives direct readings of the percentage inaccuracy. (*b*) By means of a tapping key controlling the sub-standard meter only. This is run during x revolutions of each meter under test, the percentage inaccuracy being calculated from the sub-standard reading. (*c*) By means of stop-watch against a single-phase Weston dynamometer wattmeter.

Venner stop-watches are employed and they are checked daily against a precision clock of the pendulum type.

The laboratory is lighted by Holophane "Duo Dome" reflectors suspended from the ceiling, and is heated by Ferranti adjustable-focus radiators fixed to the walls near the ceiling between the windows.

D

vigorous scuffling of the feet on a good thick rug or carpet, under such conditions, may build up a charge sufficient to jump an inch or more. As a boy, I sometimes lighted the gas by this method (*sic*).

On cold and crisp winter days, when the asphalt is dry, an automobile often gets charged in similar manner. I have occasionally received a shock in paying toll at the entrance of Boston vehicular tunnel from a charge so produced.

West Lynn, Mass., U.S.A. MALCOLM THOMSON.
May 12th.

Supply Authorities' Records

I should hate to give other members of the industry the impression that contractors are always grumbling, but I would like to air a grievance regarding the keeping of records of consumers' meters and installations by supply undertakings. Such a record is a real necessity to the authority, and it is certainly a great time saver to both contractor and consumer.

My local Council has a most efficient system in use, and a 'phone call brings within a few seconds all relevant information regarding any number, size and type of meter or meters, whether a.c. or d.c., and even details of the premises and installation. But in my experience such efficiency is indeed unusual.

A couple of weeks ago a customer informed me that she was moving to a new district. I rang up the supply company to inquire whether the supply to the premises was 100 V or 200 V, energy being supplied at both voltages. As no record existed of the premises concerned I was unable to discover the voltage. The customer then volunteered the information that she had tried a 200-V lamp in a pendant, but it only gave a faint glow. To make certain a man was sent with an a.c. voltmeter; he found that the supply was at 100 V.

About three dozen 100-V lamps, a radio transformer and iron and radiator elements were therefore supplied, and everything functioned perfectly for five days. On the sixth day a man was sent ostensibly to replace a main fuse. Then the lamps blazed with a brilliance seldom seen in domestic lighting, and smoke issued from the wireless cabinet! I telephoned the supply company and eventually I was connected with the assistant engineer (or a member of his staff), who could offer no explanation, but seemed quite interested, and asked me to let him know the solution of the "mystery." However, when I suggested that he would find it most instructive to connect a test-lamp from either side of his 200-V supply to earth, and that he might thus learn a little about the practical side of his job, he rang off hurriedly.

Obviously the installation had had an earth on one side (an unusually steady fault to last five days without flickering), but how on earth did the meter-fixer come to pass and connect a job in this condition? Admittedly the wireman was remiss in not measuring the voltage at the main switch, but a quickly accessible record card in the authority's offices would have saved all this trouble and expense.

I now have for disposal three dozen second-hand lamps (some of them having been 100 per cent. overrun), a damaged transformer, and various elements—all of this obsolescent voltage.

Now, while this sort of thing is not an everyday occurrence, it is a fact that where some undertakings are concerned it is quite impossible to get any information on the telephone or at the showrooms regarding the supply at a given address. Where a change-over is taking place, inquirers should be able to learn at once the nature and voltage of their supply. The fact that this state of affairs is only temporary is no excuse for an absence of filed records.

London, N.W.2, *May 23rd.* JOHN BLAND.

Leakage Trip Protection

I see that Mr. T. C. Gilbert in your issue of May 14th seems to question my statement that the method of parallel earth connection for leakage trips is recommended by the Home Office.

For a long time I have understood that this was the case, and I know that considerable numbers of leakage trips have been installed in this way. I think the best course would be for Mr. Gilbert to put his question direct to the Home Office.

May 24th. THE WRITER OF THE ARTICLE.

Coronation Lighting Analysed

CORONATION illuminations were discussed at a meeting of the ILLUMINATING ENGINEERING SOCIETY in London on May 19th, descriptions being given of some of the principal installations, mostly electrical.

Mr. R. O. Ackerley said that in some ways the most interesting installation was at Hampton Court Palace. He recalled that on the occasion of the Jubilee the floodlighting in this case was done with practically all-white light, which did not give an altogether satisfactory result. By mixing neon discharge lamps with tungsten floodlights the effect obtained was very close to daylight. The lighting of the Dutch Garden at Hampton Court was carried out by means of two 1,000-W projectors. Regarding water effects obtained at the Metropolitan Water Board's offices in Rosebery Avenue, Mr. Ackerley paid a tribute to the hydraulic work involved and said the actual effect was that of catherine wheels with showers of golden rain like a firework display. At Windsor Castle local floodlights between the buttresses and underneath the arches of the clerestory roof, with other lights a short distance away, showed the architectural features to the best advantage, especially in the case of St. George's Chapel. Finally, Mr. Ackerley showed some slides of Buckingham Palace.

Mr. E. Stroud gave details of the floodlighting of Westminster Abbey, which was carried out under the direction of the Office of Works. The special lighting of the interior was complicated by the presence of stands and galleries which rose half way up the windows and by the provision made for taking moving pictures and photographic records of the ceremony. The scheme was primarily to light the centres of the nave and choir and to concentrate light on the nave, which was 230 ft. long. In eleven of the arches at the triforium level were placed four 500-W projectors giving rectangular beams, so that there were forty-four units to light the nave. For the dais there were four 1,000-W units and on the altar side at the triforium level there were four of 500 W, one of which directed a beam on to the altar and the other three lighted the whole altar area. The Coronation chair was specially lighted by two 1,000-W units to a much higher intensity than the remainder. For the concentrating type and wider angle 1,000-W projectors were placed on the nearby buildings and some of the stands.

Illustrations of the Tower of London were shown by Mr. J. Catten. He said that, as in such cases there was a tendency to obtain a rather flat picture, an attempt had been made to grade the brightness, starting from the outer walls and getting gradually more brilliant toward the centre tower itself. The buttresses and bastions on the moat walls were picked out with a slightly higher intensity of illumination. Altogether 138 projectors were used in this installation, the total loading being about 110 kW. The centre portion was lighted with narrow-angle projectors from concealed positions behind the inner walls and wide-angle units were used on the main walls with a slightly fan-shaped type of beam.

The Admiralty Arch was lighted by ten units of the narrow-angle, concentrating type placed in four positions on convenient neighbouring buildings, the aim being to accentuate the lower portion of the arch. To pick out the upper portion of the façade a rectangular form of flood was used, and the total loading in this case was 55 kW. Mr. Catten said that in the cases of the Tower of London and Admiralty Arch ordinary gasfilled lamps were used, but mercury lamps were employed for the Horse Guards' Parade, and an attempt was made to produce a shadow effect. This was a little difficult owing to the different colour emission of the 80-W mercury lamps; consequently, special pale blue coloured screens were used. There were sixty-six projectors in this installation and the total load was 23 kW.

At the County Hall, Westminster, on a previous occasion discharge lamps were used for the lower portion only, but it was felt desirable to pick out a little more of the upper portion of the building on the present occasion. The difficulty was that the original red tiles on the roof had become black, so special colour screens were used. The upper portion of the building was floodlighted with a narrow-angle beam in the vertical plane, and with a wide-angle beam in a horizontal plane, the overlap between them giving a reasonably uniform effect. The tower in the centre was picked out by a number of long-range, narrow-angle units arranged on the terracing. Other slides shown by Mr. Catten illustrated some provincial schemes.

Mr. P. Good said that criticism involved danger of conveying the wrong impression on account of the circumstances of each case. For instance, there were instances in which the lighting engineers had been strictly limited by price and in others there were special difficulties. He had come to the conclusion that efforts should be made to secure collective action in the future. Some buildings were disgraceful sights from the illuminattion point of view. It was necessary somehow to sell the idea of garden ornaments incorporating lights and an effort should be made to have permanent floodlighting equipment for important buildings.

Mr. J. H. Porter showed some slides of the illuminations of the Royal Naval College, Greenwich, which, he said, represented a load of 120 kW.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

A Combined Kettle and Milk Warmer

An electric kettle with several additional uses is a recent introduction by ELTRON, LTD., Salisbury Square House, London, E.C.4.

The loading is 1 kW and the capacity 3¼ pints. By releasing a small thumb clip the immersion heater can be quickly removed from the kettle. The fur can then be cleaned out, the kettle being of the straight-sided pattern with a wide opening. The bottom of the water container proper is insulated from the base by an air chamber, thus allowing the kettle to be boiled in safety upon a polished table top. After removal the immersion heater can be used in any other vessel.

The Eltron "Combinax" unit

A milk warmer or porringer is made to fit into the kettle and can be supplied separately; this is a more satisfactory method of warming than the use of an electric hot-plate and an ordinary saucepan. The company has issued some interesting comparisons in this respect. Water takes approximately 3½ min. to boil. Milk heated in the "Combinax" rises from 5 deg. C. to 95 deg. C. in 10½ min. The same quantity on a hot-plate of the same loading took 12 min., the saving in electricity used being 17 Wh.

Loop-rod Immersion Heaters

A range of loop-rod immersion heaters has been developed by G. BRAY & CO., LTD., Leeds, 2. They are designed for easy fixing to any existing hot water storage tank, various sizes of heater being available. For water heating a tinned copper tube is used, but other metals can be supplied to meet special requirements. After being bent to the shape of a hairpin the ends of the element are brazed into a screwed brass boss and the heater is completed by the provision of suitable terminals, an earthing connection and a cover.

A kettle fitted with a Bray loop-rod element

Made on the same principle, a new kettle element is bent so that it lies at the bottom of the kettle, thus allowing small quantities of water to be boiled in a large kettle. The safety device comprises a bi-metallic catch which holds in position a spring-loaded plunger forming part of the element circuit.

Testing Insulating Oil

Transportable equipment of an improved type for checking the dielectric strength of oil has been developed by the BRITISH THOMSON-HOUSTON CO., LTD., Rugby. The set is divided into two units: one of them (weighing 42 lb.) contains the 50,000 V testing transformer, and the other (weighing 15 lb.) comprises the tapped auto-transformer for voltage adjustment, main and tapping switches, voltmeter calibrated in kilovolts, instruction cards, and components for the testing cell and leads.

The glass testing cell and its sphere gap are made strictly in accordance with British Standards Specification No. 148, and the rating of the equipment is such that a definite breakdown of oil is obtainable. The recent improvements in the design of these testing sets are accompanied by a reduction in cost.

Portable oil-testing set ready for use, transformer cover in centre

Domestic Appliances

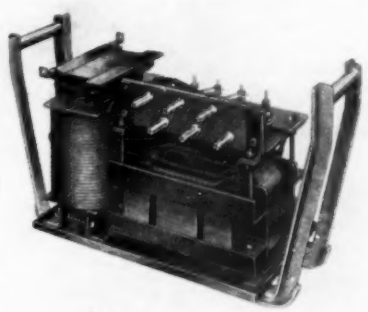
Three new lines recently added to the "Duco" range of domestic appliances by BROWN BROTHERS, LTD., Great Eastern Street, London, E.C.2, who have sent us details, include a streamlined desk lamp complete with flex and standard 5-A plug and finished in black and chromium with a push-switch in the heavy base. It is instantly adjustable without manipulating wing-nuts and the deeply hooded shade provides a high concentration of light and makes it suitable for either home or office use.

Three new "Duco" appliances

The remaining articles consist of a coffee percolator and a water or milk heater. Of polished aluminium and graceful shape they have an attractive pewter finish. The insulated feet are well spaced on a wide safety base, whilst the handles are of heat-resisting material. The loading is 650 W in each case, and there are alternative ranges of voltages—200-220 V and 230-250 V.

Lightweight A.c. Welding Set

A lightweight a.c. welding set introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, is suitable for repair work carried out at garages and light constructional work undertaken by blacksmiths or millwrights, for which a medium welding current (up to 100/120 A) is required. The tank has a removable cover and all stresses due to handling are taken by the base; handles are provided, while skids facilitate dragging the set over the ground.



The new G.E.C. lightweight welder

The current ranges from 40 to 120 A, plugs and sockets being provided for adjustment in steps between these limits. Very fine current regulation (for example for welding thin sheet-metal) is effected by varying the reluctance of the magnetic circuit of the choke coil. The set can be made to operate on single-phase 50-cycle supplies at 190/240 and 380/480 V.

British Overseas Electrical Trade

31 per cent. increase in exports

EACH succeeding month this year has so far brought a further expansion in our overseas electrical trade, both imports and exports. In April British exports of electrical equipment amounted in value to £1,594,561, which, as we mentioned in a brief report on the Board of Trade returns last week, is higher than for any month since 1929. It exceeds the March total by £105,910, whereas the value of our exports generally fell by £443,000. Comparison with the corresponding month of last year is even more favourable, the increase of £381,499 being equal to 31 per cent., which is a much larger proportionate expansion than customary. Imports, at £433,587, were £27,695 more than in March and £90,603 (26 per cent.) in excess of the total for April, 1936. In the various comparisons it is necessary to take into account recent increases in prices of materials and the fact that last month contained twenty-six working days, against twenty-five in March and twenty-four in April, 1936.

The analysis of electrical exports in the accompanying smaller table reveals that the improvement last month was widely distributed, there being only one small decrease among the various types of goods and apparatus. The principal falling off in the machinery section was in transforming and converting plant, for which reduced exports to South Africa and India appear to have been responsible.

Last month we commented upon the large increase in the value of cable exports other than the submarine type, namely, £115,393, or 53 per cent. In April this was intensified, the total of £393,010 being £171,040, or 77 per cent. more than in the same month of 1936, apart from which there was an increase of £30,001 in shipments of submarine cables.

Some idea of the destinations of exports of wires and cables other than telegraphic and telephonic types is conveyed by the following analysis, with April, 1936, values in parentheses :—

Rubber insulated wires and cables.—South Africa, £29,006 (£29,656); Australia, £25,854 (£23,724); British India, £19,320 (£12,407); New Zealand, £6,115 (£7,369); other British countries, £23,879 (£12,521); foreign countries, £17,106 (£5,574).

Electric wires and cables, insulation other than rubber.—South Africa, £50,410 (£28,221); Australia, £40,989 (£17,119); British India, £30,893 (£17,509); other British countries, £19,535 (£19,676); foreign countries, £24,016 (£8,537).

It is seen that foreign countries contributed substantially to the expansion.

Radio exports were also satisfactory. The number of complete receivers other than radio-gramophones shipped abroad was 5,079 against 2,554 in April, 1936, while exports of valves increased from 89,550 to 223,517. Imported valves numbered 131,131, against 531,234, or a fall in value of £31,415, but there was a large addition (+£46,797) to the value of imported radio parts and accessories.

With regard to exports of telegraph and telephone apparatus other than radio, the chief destinations were as follows, with comparative values in parentheses :—

Australia, £43,794 (£17,293); South Africa, £15,870 (£45,315); Argentina, £2,533 (£18,052); other British countries, £51,601 (£21,041); other foreign countries, £41,108 (£45,134).

Further indications that rising prices alone do not account for the higher value of exports are that the number of electric lamps shipped overseas last month was 2,001,646 (1,427,678 in April, 1936) and house service meters 13,285 (9,601). Generating plant exports totalled 737 tons (315 tons) and motors 933 tons (784 tons).

Scrutiny of the accompanying larger table reveals that the greatest increase in exports of goods and apparatus was to New Zealand (+£71,576). As a market for British electrical equipment the Dominion is now almost equal to much larger countries such as India and Australia. Recovery is noticeable in exports to Italy.

That a large number of cheap lamps was brought into this country last month is shown by the fact that whereas the value of such imports increased by only £4,289 to £16,188 the number rose from 1,917,078 to 4,196,835. So far this year 18,281,325 electric lamps have been imported, against 8,773,008 up to the end of April, 1936.

The principal sources from which imports of electrical goods were derived were as follows, with April, 1936, values in parentheses :—United States, £103,408 (£97,973); Germany, £75,177 (£58,815); Netherlands, £69,557 (£41,358); Belgium, £28,114 (£7,649); Switzerland, £17,788 (£18,648); Austria, £6,209 (£4,063); France, £5,739 (£11,891); other foreign countries, £28,520 (£21,367); British countries, £6,967 (£16,424).

In the first four months of this year our electrical exports amounted in value to £5,718,066, against £4,876,104 in the corresponding period of last year, and imports to £1,557,263 (£1,285,272).

EXPORTS AND IMPORTS DURING APRIL

	Exports. April, 1937.	Exports. Inc. or dec. compared with April, 1936.	Imports. April, 1937.	Imports. Inc. or dec. compared with April, 1936.
Submarine telegraph and telephone cables	£32,247	+ £30,001	*	—
Telegraph and telephone wires and cables (not submarine)	105,887	+ 66,230	*	—
Other insulated wires and cables	287,123	+ 104,810	£51,208	+ £31,294
Radio receivers, not radiograms (excluding valves)	34,406	+ 16,910	14,918	— 6,454
Radio transmitters (excluding valves)	20,041	+ 7,253	*	—
Radio valves	49,977	+ 23,954	14,507	— 31,415
Other radio parts and accessories	38,568	+ 2,031	100,436	+ 46,797
Telegraph and telephone apparatus (other than radio)	154,906	+ 8,071	*	—
Electric carbons	*	—	6,218	— 5,674
Incandescent lamps	61,030	+ 11,435	16,188	+ 4,289
Other lighting apparatus	58,231	+ 21,596	40,195	+ 11,424
Primary batteries	16,322	+ 4,409	*	—
Accumulators	49,370	+ 19,942	*	—
Electric cooking and heating apparatus	29,271	— 510	*	—
House service meters	15,749	+ 5,176	*	—
Other electrical instruments	19,545	+ 1,189	22,471	+ 863
Unenumerated electrical goods and apparatus	117,435	+ 4,449	75,308	+ 12,137
Electric generators up to 200 kW	49,143	+ 23,144	*	—
Electric generators over 200 kW	70,559	+ 48,025	*	—
Electric motors	125,422	+ 22,948	39,076†	+ 8,983
Convertors and transformers	69,224	— 38,739	*	—
Starting and controlling gear for motors	50,471	— 3,869	*	—
Switchgear	102,440	— 953	*	—
Other electrical machinery	14,217	+ 2,239	36,227	+ 22,379
Electric vacuum cleaners	22,977	+ 1,758	16,835	— 4,020
Total	£1,594,561	+ £381,499	£433,587	+ £90,603

* Not classified separately. † Not railway and tramway motors.

BRITISH ELECTRICAL EXPORTS DURING APRIL

Destination.	Goods and apparatus, April, 1937.	Inc. or dec. compared with April, 1936.	Electric generators, April, 1937.	Inc. or dec. compared with April, 1936.	Electric motors, April, 1937.	Inc. or dec. compared with April, 1936.	Other electrical machinery, April, 1937.	Inc. or dec. compared with April, 1936.
Irish Free State	£30,706	+ £5,496	*	—	*	—	*	—
Channel Islands	13,125	+ 3,458	*	—	*	—	*	—
Union of South Africa	215,065	+ 52,543	£16,054	+ £13,595	£38,370	+ £2,448	£76,988	— £58,295
British India	127,885	+ 41,980	20,543	+ 14,685	11,218	— 3,660	36,125	— 14,923
British Malaya	31,928	+ 8,505	*	—	*	—	8,085	— 1,553
Ceylon	15,640	+ 8,821	*	—	*	—	*	—
Hong Kong	11,894	+ 7,999	*	—	*	—	*	—
Australia	171,707	+ 71,327	18,938	+ 8,349	12,783	+ 2,485	25,585	+ 9,767
New Zealand	122,860	+ 71,576	*	—	4,391	+ 640	17,951	+ 9,919
Canada	14,404	+ 5,066	2,905	— 3,089	7,369	+ 3,232	4,036	+ 2,782
Other British Countries	79,198	+ 32,345	43,984	+ 37,044	22,054	+ 9,516	27,869	+ 9,814
Sweden	7,644	— 1,998	*	—	*	—	*	—
Denmark	15,719	+ 6,292	*	—	*	—	*	—
Netherlands	18,505	+ 9,741	*	—	*	—	5,208	+ 4,370
Belgium	12,862	+ 3,587	*	—	*	—	*	—
France	18,238	— 967	*	—	*	—	4,186	+ 2,173
Portugal	13,185	+ 8,047	*	—	*	—	*	—
Spain	1,151	— 3,698	*	—	*	—	*	—
Italy	10,258	+ 8,380	*	—	*	—	*	—
Greece	2,527	+ 574	*	—	*	—	*	—
Rumania	5,335	+ 4,698	*	—	*	—	*	—
Egypt	12,278	+ 2,656	*	—	*	—	1,731	+ 526
China	8,236	— 11,436	*	—	*	—	1,590	— 2,777
Brazil	9,322	— 6,282	*	—	*	—	*	—
Argentina	38,158	— 6,831	*	—	*	—	4,854	+ 3,196
Other Foreign Countries	82,278	+ 5,067	17,278	+ 585	29,237	+ 8,287	22,144	— 6,321
Total	£1,090,108	+ £326,946	£119,702	+ £71,169	£125,422	+ £22,948	£236,352	— £41,322

* Not classified separately.

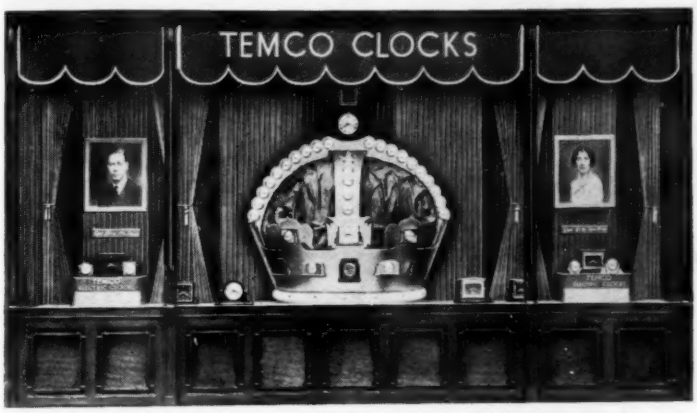
Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

E.D.A. Activities

Capt. J. C. Chaytor, who was chairman of the Central England Area Committee of the E.D.A. from 1934 to 1936, on severing his connection with the Tamworth District Electric Supply Co., Ltd., gave twenty-five guineas to be awarded to students who secure the highest marks in the first set of examinations for the E.D.A. salesmanship certificate and who belong to small undertakings in the Central England Area which are members of E.D.A. For the purposes of this competition a small undertaking is one selling less than ten million kWh per annum, based on the returns for 1935 in the case of companies and to March, 1936, in the case of local authorities. Capt. Chaytor later agreed that the competition should be open to students from small undertakings (members of E.D.A.) throughout the whole country, and the prize money has therefore been divided as follows:—National competition: First prize, £10; second, £5; third, £2 10s. Central England Area competition: First prize, £5; second, £2 10s.; third, £1 5s. Students from the Central England Area will thus have a chance of winning both the National and the Area prizes if they should be among the first three in the National competition.

The sales and Publicity Programme of E.D.A. for June contains illustrations of two new double-crown posters relating to water heating, while a booklet entitled "Cold Cooking," showing how to use a domestic refrigerator to the best advantage, is now available. A folder, also dealing with electric refrigeration, has been prepared for inclusion with accounts. This contains a series of questions and answers which settle most of the queries that prospective refrigerator purchasers are likely to raise. Special attention is drawn to the processional car and to the summer number of "Electrical Housekeeping."



A "Temco" clock Coronation window display

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable-making Industry announces that the May 1st cost-of-living figure (52 per cent above the 1914 level) will not involve any alteration in the wages of workers in the industry on the third pay day in June.

The Price of Rubber

A *Reuter* message from Singapore states that Sir Thomas Shenton, Governor of the Straits Settlements and High Commissioner of the Federated Malay States, in opening the new laboratory at Kuala Lumpur on May 19th, said that the Malayan Government would do all in its power to maintain the price of rubber at a reasonable level, which he conceived to be 9d. or 10d. per lb. Cheap rubber was the best insurance against synthetic competition. He stressed the wisdom of lower costs of production, and stated that he saw good hope for the future in the industry's co-operation with research.

A Modern Newspaper Press

Machinery for printing news is commonly known as the line press, and a modern example of this is the installation of two 12-unit line presses at the *Daily Mail*. These high-speed presses employ, on the unit system, a separate motor manufactured by J. H. Holmes & Co., Ltd., for each black, folder and colour deck unit. The motors are of 45-50 h.p. and run at 1,500 r.p.m.. The transmission in each instance between motor and first-impression cylinder is by one-strand Renold "Triplex" roller chain. Each drive is enclosed in an aluminium casing and incorporates jockey adjustment. From the main motors on the black drives Renold "Triplex" roller-chain drives are taken to auto-pasters. The thirty-two main drives which are installed on each of the two line presses are lubricated by a Renold group-lubrication system which employs three independent motor-driven pumps for each line of presses. In addition to the main drives the lubrication system also deals with all auxiliary chain drives.

Argentine Lamp Production

A new works for the production of electric lamps and radio apparatus has been established in Buenos Aires by the Dutch Philips Company. It appears that the import duties were too high to permit of the Dutch products competing in Argentina.

A Coronation Window Display

The accompanying illustration shows a Coronation window display of "Temco" synchronous electric clocks, designed for T.M.C.-Harwell's Britannia House window by the advertising department of the Telephone Manufacturing Co., Ltd. A feature of the display is forty-six "Temco" clocks, thirty-six of which are mounted in a large crown. The majority of these have been specially chosen for their size, colour and finish, to represent the jewels in the crown, circular and rectangular clocks representing the orb and cross at the top of the crown. The backcloth is made up in pleated panels of Coronation red and blue, red curtains surround the portraits of the King and Queen, and a blue pelmet picked out in gold conceals a battery of floodlight projectors.

Employment in April

Employment in the engineering industry improved generally during April and was good on the whole, being very good in electrical engineering. According to the *Ministry of Labour Gazette* the total out of work in the engineering industry was 56,112, a decrease of 4,214, the percentage falling from 5.7 to 5.3 (8.6 per cent. in April, 1937). In the electrical engineering section the number of unemployed was 3,283, or 3.2 per cent. (against 3.4 per cent. in March and 4.9 per cent. in April, 1936). The unemployed in the electrical wiring and contracting industry numbered 3,767, the percentage falling from 10.2 to 9.9 (12.6 per cent. in April, 1936). In the electric cable, apparatus, lamps, &c., group, the unemployed decreased from 8,983 to 8,089, the percentage falling by 0.6 to 5.3 (8.2 per cent. in April, 1936).

The Scunthorpe Showrooms

"Electricity House," the new showrooms of the North Lincolnshire and Howdenshire Electricity Co., was recently opened in High Street, Scunthorpe. In addition to the general showroom, a special feature of the new premises is a model kitchen in which cooking demonstrations will be given weekly by Miss C. Nowell, one of the company's demonstrators. The showrooms were opened by the Mayor, Ald. B. Holland, and Mr. W. B. Woodhouse (managing director), who presided at the luncheon which followed, announced that the company was introducing a new tariff which would result in substantial reductions in the price of electricity for those who made use of the many domestic labour-saving appliances now available. The tariff consists of a fixed charge dependent on the size of the house and a "unit" charge of ¾d. for all electricity consumed.

The new Scunthorpe showrooms of the North Lincolnshire and Howdenshire Electricity Co.

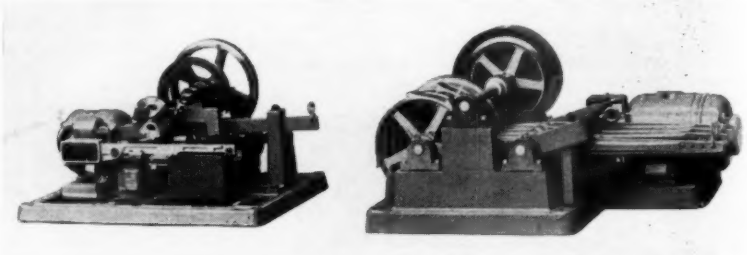
The Mundi Hydro-electric Scheme

The suit filed by the Lahore Electric Supply Co. against the Punjab Government and the Secretary of State for India in London seeking an injunction, restraining the Government from supplying energy from its Mundi hydro-electric scheme, has been dismissed with costs. The company contended that the Government could not turn itself into a business concern and violate the terms of the licence granted to the company. For the Government it was claimed that the licence was not granted as a monopoly to the company, and that the Government was supplying energy to one of its own concerns.

Recent Contracts

The State Electricity Commission of Victoria, Australia, has duplicated an original order placed in 1933 with the British Electric Transformer Co., Ltd. (an associated company of Crompton Parkinson, Ltd.), by giving a further order for a 37,500-kVA, three-phase, 50-cycle, 132/22/11-kV transformer of the oil-immersed naturally cooled, outdoor core type. These transformers are designed for operation without lightning arrestors, and their equivalent double-wound output is about 50,000 kVA. Their shipping weight is about 60 tons and it is claimed that they are the largest transformers yet exported from England to Australia.

An unusual application for electric motors is shown in the accompanying illustration. The motors were supplied by Crompton Parkinson, Ltd., to Gent & Co. for electric striking and chiming mechanism to be installed at Leicester Cathedral. The equipment is for operating the Westminster chimes and hour bell at the cathedral and is the gift of various well-known people in Leicestershire to commemorate the Coronation of King George VI. The total weight of the bells for sounding the quarters is 40¼ cwt. The hour bell weighs 25 cwt. Two Crompton Parkinson motors are employed. That shown on the chiming mechanism (on the left) is of ¼ h.p. The striking mechanism, shown on the right, is operated by a ½-h.p. motor.



Electric chiming and striking mechanism for Leicester Cathedral

Murex Welding Processes, Ltd., has recently received an order from the British Admiralty for eight 50 kW level compound wound motor generator arc welding sets. These machines will be of special design in order to eliminate the possibility of interference between welders who are working at the same set.

Mersey Tunnel Visit

On May 8th the English Electric (Stafford Works) Engineering Society paid a visit to the George's Dock ventilating station of the Mersey Tunnel. The visit was arranged by the courtesy of the Mersey Tunnel Joint Committee, and the party was conducted through the tunnel and the ventilating plant by members of the staff of the Liverpool city electrical engineer, Mr. P. J. Robinson, who is responsible for the operation and maintenance of the electrical equipment connected with the tunnel.

A New Fractional-h.p. Motor Factory

Since the establishment in 1911 of the firm of G. H. Carter & Sons, electric motor manufacturers, its history has been one of continuous development and an important stage was reached recently when production was transferred from Stratford to a more modern and commodious factory with up-to-date equipment in Eastern Avenue, Romford. Here are now made fractional h.p. electric motors of every type from 1/200 to ¼ h.p., all the components except the iron castings, stampings, and ball bearings being produced on the premises. The 10,000 sq. ft. of floor area is divided into two main sections, one a machine shop and the other a winding, assembly and testing department. In addition, there is a separate non-ferrous metal foundry. Mr. H. J Carter, one of the partners of the firm, tells us that it has a steady all-the-year-round business and makes a speciality of motors for such appliances as fans, hair-dryers, sewing machines, steam unit heaters and totalisators. There is a big demand for geared motors which are made with single, double or triple reduction for speeds down to as low as one revolution in ten minutes. All the gears are cut in the works. Duplication of plant made it possible to change over to the new factory with the minimum interference with production and adequate space has been acquired for future extensions. At the moment the factory provides work for about sixty employés, all male.

The E.L.M.A. in Scotland

The present premises of the E.L.M.A. Lighting Service Bureau of Scotland at 29, St. Vincent Place, Glasgow, which includes 900 sq. ft. of showroom area, was acquired in 1933. Advantage is now being taken by Mr. M. W. Hine, the Bureau's district engineer, of the a.c. supply (which has only recently become available) to demonstrate mercury-vapour discharge lamps (including the 80- and 125-W sizes) and the utilisation of ultra-violet light by means of fluorescent powders.

Since 1926, when the Bureau originated at the Glasgow Corporation Lighting Department, 750 lectures have been given to more than 40,000 people and 5,000 visitors have attended. The light-sight testing cabinet has shown that the average value of illumination for reading newsprint is about 100 ft.-candles—approximately twenty times that available with present domestic lighting.

Holidays with Pay

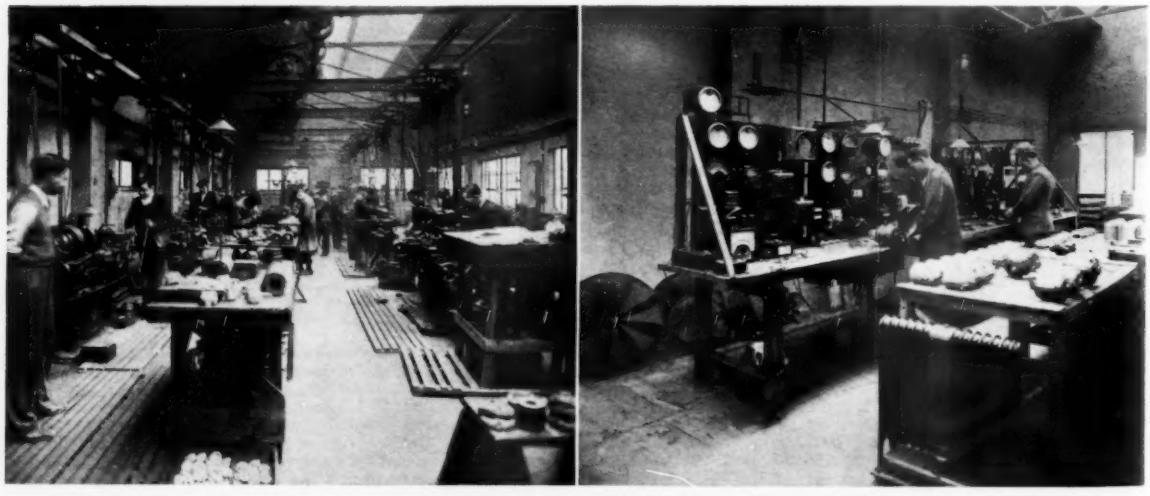
Prentice, Ltd., have now commenced to pay their employés for all holidays, *e.g.*, Whitsun, August Bank Holiday, Christmas and Easter, on full pay, which is equal to 12¼ working days' holiday per year for each employé. Mrs. White, M.A., has been appointed senior welfare supervisor, to take full control of the Welfare Department.

The N.A.R.R. (Birmingham Branch)

The National Association of Radio Retailers, Ltd., has formed a Birmingham and District Branch. Mr. H. F. Truman has been elected chairman and Mr. W. S. Walkinshaw vice-chairman. The branch secretary is Mr. R. T. Janney, 33, Newhall Street, Birmingham.

German Electrical Exports

According to official statistics the value of exports of electrical products from Germany in 1936 amounted to Rm. 266 million, as compared with Rm. 233 million in 1935, Rm. 226 million in 1934 and Rm. 639 million in 1929. The share of Germany in the world exports is stated to have been 26.1 per cent. in 1936, as compared with 25.8 per cent. in the previous year.



The machine shop and testing bench at G. H. Carter & Sons' electric motor factory

A Coronation Procession Display

The accompanying illustration shows an exhibit which took part in Leicester's Coronation procession. The chassis is a standard Wilson electric vehicle and the tableau was inspired by the film of Mr. H. G. Wells, "Things to Come." The

A tableau by Partridge, Wilson & Co. in Leicester Coronation procession

personnel were members of the staff of Partridge, Wilson & Co., Ltd., and the costumes were those actually worn by the leading actors in the film.

Trade Announcements

Standard Switchgear, Ltd., Hornchurch, has registered a subsidiary company, Switchgear & Meters, Ltd., with a capital of £6,000, for the purpose of manufacturing meters and other apparatus. Mr. A. G. Collis is governing director, and the other directors are his two sons, Messrs. J. A. and C. G. Collis, and Messrs. A. W. Angold and D. A. P. Hill. Standard Switchgear holds the controlling interest. Extensions have been made to the existing works at Hornchurch.

Superfluxes, Ltd., which was registered in January last, has now commenced full production at its factory at Perivale, Middlesex, and announces an all-round reduction in the prices of its "Superspeed" cored solders for radio, telephone and general electrical work.

Vatric, Ltd., announces that the disorganisation caused by the recent fire at its premises has now been overcome and the headquarters are now at Clifton House, Euston Road, N.W.1. Three branch sales offices have been opened in London and an office will shortly be opened at Dorking. Additional representatives have been appointed to handle local areas.

The Simplex Electric Co., Ltd., has removed its head office to Broadwell Road, Oldbury, Birmingham (telephone: Broadwell 1515).

The works of Sterling Works (Dagenham), Ltd., will be closed from May 28th until June 14th for stock-taking and works' holiday.

A. J. Andrews, Ltd., have removed to Gamage Buildings, Holborn, E.C.1 (telephone: Holborn 4589).

The Glasgow office of the Hotpoint Electric Appliance Co., Ltd., has been removed to 89, West Campbell Street, Glasgow, C.2.

Social Events

The Wallasey and Birkenhead Electrical Trades Golfing Society held its monthly competition at Hooton Golf Course last week. Forty-eight members competed for the president's prize, the winner of which was Mr. W. Hobson, with 35¾ points. The prize for division A was won by Mr. W. Foster with 35¼ points. The first prize in section B was won by Mr. W. T. Edwards with 34 points, and the prize for Class C by Mr. T. J. McCabe with 32 points.

An Exhibition of Modern Architecture

In view of the wide interest that the proposed Exhibition of Modern Architecture by the Mars Group has aroused the organisers have decided to enlarge its scope. As this necessitates extensive structural changes to the New Burlington Galleries, where the exhibition will take place, the opening is postponed until October.

N.D.C.

In response to the criticism to which his proposal to levy a tax on increased profits has aroused, the Chancellor of the Exchequer has announced a number of modifications of his original scheme. The National Defence Contribution is to be calculated in a similar way, *viz.*, upon the growth of profits above the average for a certain period, but this period has been altered to include the year 1936, and optional bases are conceded. The alternative basis of charge—*i.e.*, the increased return on a given capital—has also been adjusted favourably to the taxpayer. Businesses earning a profit of not more than £2,000 a year will be exempt from the tax, and there will be a right of appeal against assessments to a board of referees. If the losses incurred during the computation period exceed the profits, the balance may be carried forward to later years. There are a number of other concessions.

Demonstrators' and Saleswomen's Salaries

As a result of many requests from the electrical industry the National Training and Diploma Committee of the Electrical Association for Women recently conducted an inquiry into the prevailing salary standards and conditions for women demonstrators and saleswomen in the industry. The Committee had the advice of Alderman Walker, chairman of the National Joint Council and National Joint Board (technical staff) for the Electricity Supply Industry, in its deliberations. Already preliminary forms of a statement have been issued to employers' associations and others and it has been used as a basis in the fixing of salaries in several instances. The statement will be issued to those having a personal interest in the question on request to the E.A.W. headquarters, 20, Regent Street, S.W.1.

A Useful Photographic Manual

Most people are photographers nowadays. The electrical engineer, in particular, finds the camera of considerable use in recording the progress of a job and for many other purposes. For this reason a manual intended for the non-expert is always to be welcomed if it helps to secure better results. Such a volume is "Brighter Photography," by David Charles, F.R.P.S. (Iliffe & Sons Ltd., 2s. 6d. net, postage 4d.). In 143 profusely illustrated pages this explains such matters as the choice of camera, focusing, shutters and "stops," composition, lighting and developing and printing processes, and is well worth its moderate price.

Price of Materials

Henry Gardner & Co. report, May 26th: Copper bars (best selected), sheet and rod, £97, £2 inc. English pig lead, £26 15s., £1 15s. inc. Spelter, £23 18s. 9d., £2 1s. 3d. inc. English block tin, £253, £3 15s. inc.

Frederick Smith & Co. report, May 26th: Electrolytic copper bars, £67, £1 inc. Ditto, ditto, wire rods, £72, £1 inc. Ditto, ditto, h.c. wire, 10-7/16d., 1/16d. inc. Silicium bronze wire, 10½d., 1/8d. inc.

Edward Till & Co. report, May 26th: No change in the price of India rubber, Para fine.

Tables of Electricity Undertakings

The fiftieth edition of "The Electrician Annual Tables of Electricity Undertakings" for 1937 (10s. net, postage 9d.), which we have just received from Benn Bros., Ltd., contains in its 242 pages comprehensive tables covering the home country, the Empire overseas, and foreign undertakings. Apart from the systems of electricity supply, consumers' voltages, prices of energy, addresses of head offices and showrooms, and similar information of interest to the consumer or the supplier of electrical apparatus, details of interest to the supply engineer and manufacturer are included, such as generating and transmission voltages, generating sets, number of consumers, and steam-raising plant, while the comparative price of gas per therm is given. The book also contains a summary of the state of technical development of the grid system, consisting of tabulated particulars of areas, selected stations, their owners and tariffs, and a map of the grid transmission lines.

Rugby Coronation Carnival

A carnival was held at Rugby on Coronation day, a feature of which was a lorry entered by the Hotpoint Electric Appli-

"Ancient" and modern cooking methods represented in a Hotpoint Carnival tableau at Rugby

ance Co., Ltd. The tableau was designed to show the striking changes which have taken place in kitchen equipment during the last twenty-six years, and effectively illustrated the clean lines of the modern design.

The South African Year Book

The 1936-37 edition of the *Official South African Municipal Year Book* (London agents: Edward G. Allen & Son, Ltd., 25s. net) has just been received. With the growth of engineering and electrical enterprise in South Africa the particulars in this section are more comprehensive than those published previously and will be of considerable use to engineers and

others. Data relative to municipalities and local bodies has been revised and the comparative statistics relating to finance, populations, tramway undertaking, water supply, electric light, engineering data, and motor transport are dealt with in such a manner as to form a comprehensive reference to the whole of South Africa. The section gives details of overseas flotations by South African municipalities.

New Catalogues and Lists

R. Cadisch & Sons, Red Lion Square, London, W.C.1.—A 164-page wholesale electrical catalogue has been issued, with prices at May 1st. The book, which is one of the most complete reference works of its kind, is divided into three sections for domestic appliances, fittings and wiring and general supplies. It is well bound and copiously illustrated.

British Insulated Cables, Ltd., Prescot.—A pamphlet relating to a d.p. iron-clad switch and fuse box.

Mallinson & Eckersley, Ltd., Worsley Street, Salford, 3.—A catalogue of floor standards and table lamps in various woods ("Blackfriars Ware") and a leaflet relating to woven wood screen fires.

Brook Motors, Ltd., Huddersfield.—A booklet dealing with the application of motors in laundries.

Bakelite, Ltd., 68, Victoria Street, London, S.W.1.—A copy of "Bakelite Progress."

Hackbridge Electric Construction Co., Ltd., Walton-on-Thames.—A leaflet dealing with Hackbridge transformers.

Simplex Electric Co., Ltd., Empire House, Great Charles Street, Birmingham, 3.—Catalogues of "Creda" cookers and water heaters.

Normand Electrical Co., Ltd., North Street, Clapham Common, London, S.W.4.—A catalogue of "Neco" three-phase motors, giving technical details.

Frederick Thomas & Co., Ltd., 189-191, Drummond Street, Hampstead Road, London, N.W.1.—A new illustrated catalogue of "Efteelite" lighting fittings.

Samuel Osborne & Co., Ltd., Clyde Steel Works, P.O. Box No. 1, Sheffield.—A catalogue of "Osbornite" carbide alloy.

Aluminium Union, Ltd., Bush House, Aldwych, W.C.2.—A pamphlet giving particulars of foundry alloys.

Bankruptcy Proceedings

H. G. Hayward, 42, Wilton Avenue, Southampton, lately carrying on business at Cambridge Road, Southampton, and formerly under the style of "Modern Electric Service," 186, Bitterne Road, Bitterne Park, Southampton, as an electrical engineer and radio dealer.—The public examination was held recently at the Court House, Castle Square, Southampton. It was reported that there was a deficiency of £374. Debtor attributed his failure to insufficient trade. The examination was adjourned.

A. J. Payne, radio dealer, lately carrying on business at Hill side, Stonebridge Park; 327, Kilburn Lane; and Station Road, Harlesden.—The first meeting of creditors under this failure was held on May 20th at London Bankruptcy Buildings. The failure is attributed by the debtor to liabilities incurred under guarantees given in connection with his wife's business during the period that he managed it on her behalf. The case was left in the hands of the Official Receiver to be wound up in bankruptcy.

A. H. Estall, 20, Thackeray Street, Kensington, London, W.8 trading as Henry Estall, electrical contractor.—The first meeting of creditors in this matter was held on May 19th at Carey Street, W.C.2. Mr. H. Newman, Assistant Official Receiver, stated that debtor had estimated his liabilities at £1,221 and his assets at £451. Debtor stated that in the middle of last year an electrical installation contract was undertaken at too low an estimate, and he lost about £400 on it. He attributed his failure entirely to that loss. The creditors decided to appoint Mr. W. A. J. Osborne, of Corfield and Cripwell, accountants, Balfour House, Finsbury Pavement, E.C., as trustee of the estate.

J. H. S. Page, 19, Hurstfield Road, West Molesey, Surrey, lately 374, Hurst Road, West Molesey, and 192, Walton Road, East Molesey, radio and electrical engineer.—This debtor attended at the Guildhall, Kingston, Surrey, recently for a further hearing of his public examination. He was questioned by the Deputy Official Receiver regarding an item of £150 in his statement of affairs as estimated stock not accounted for. The debtor stated that that represented stock missing from the shop when it was closed down and which could not be accounted for. The examination was again adjourned.

E. M. Swift, electrical engineer, 10, Joinings Bank, Langley Green, Worcester.—Receiving order made May 14th on debtor's own petition.

C. H. F. Thick, 1, Nuns Walk, Winchester, lately carrying on business at 1, Nuns Walk, Winchester, in partnership with S. W. West as electrical engineers.—Receiving order made May 18th on debtor's own petition.

A. Hitner, electrical engineer and radio dealer, 7, Linden Grove, Fallowfield, Manchester.—Trustee, Mr. A. T. Eaves, 47, Mosley Street, Manchester, appointed May 14th.

D. W. J. Prentice, electrical engineer, 59, Brecon Road, Fulham, S.W.—Trustee, Mr. C. B. Park, Bankruptcy Buildings, Carey Street, W.C.2, Official Receiver, released May 7th.

A. Boards ("The Southern"), radio dealer, 253, Barlow Moor Road, Chorlton-cum-Hardy, Manchester.—Trustee, Mr. F. H. Langmaid, Byrom Street, Manchester, 3, Senior Official Receiver, released May 5th.

A. E. Baker, electrical engineer, 42, Chapel Road, Bexley Heath.—Public examination June 14th at the Court House, Rochester.

R. W. Burrows (Radio Services), High Street, Skegness.—Receiving order made May 20th on debtor's own petition.

Electricity Supply in the London Area

EACH year the London and Home Counties Joint Electricity Authority publishes a "General Review of Statistics" relating to the electricity supply undertakings in its district. That issued during the past week (5s. from the Authority) is the tenth of the series and covers the year ended March 31st, 1936, for local authorities and December 31st, 1935, for companies.

The district, 1,841 sq. miles, with a population of 9,088,000, stretches from Hertford and St. Albans to Dorking and Reigate and from Windsor to Gravesend. It includes the areas of eighty-two undertakings, which are shown in different colours on a folding map. Of these, 16 are Metropolitan Boroughs, 29 extra-London municipalities, 14 London and 22 extra-London companies, and the J.E.A. itself.

There were 55 generating stations in operation with an aggregate plant capacity of 2,264,000 kW, but the number of selected stations is only 27 (13 municipal) in which 2,074,000 kW is installed (559,000 kW municipal). The maximum load on undertakings aggregated 2,202,000 kW including bulk supplies given and on generating stations alone, 1,629,000 kW. To correspond with the latter 5,121 million kWh was generated (4,995 million under direction of the Central Electricity Board) of which 991 million formed the contribution of public authorities. More than nine-tenths of the output came from stations with over 60,000 kW installed.

Connected load totalled 6,357,000 kW (2,587,000 kW municipal)—an advance of 14.7 per cent. over the previous year. The number of consumers connected reached 1,999,000 (1,096,000 municipal) or 11.8 per cent. more. In addition to the above figures 1,043 million kWh was generated by railway and transport authorities, of which the London Passenger Transport Board was responsible for 799 million. By the inclusion of these the kWh generated per head was raised from 564 to 678. No particulars regarding private generating sets are available.

Excluding bulk supplies to authorised undertakings, the kWh sold totalled 3,778 million (1,558 million by municipalities) an increase of 13.5 per cent. on the preceding year. Apportioned to different classes of consumers, the percentages are: lighting, heating and cooking, 49.9; power, 35.7; public lighting, 2.3; traction, 12.1. The first class was responsible for the greatest increase over the previous period, 21.7 per cent., power increasing by only 5.1 per cent.

There were decreases in the average price received per kWh of 0.225d. in the former case and 0.029d. in the latter. Revenue from lighting and domestic supplies worked out at 1.84d. per kWh, from power 0.81d., from public lights 0.98d. and from traction 0.47d. Separately metered lighting supplies (one-third of the total kWh for the class) came to 3.12d. per kWh and for heating and cooking (one-sixth) 0.87d., the price for the remainder with combined metering being 1.34d. per kWh.

Capital expenditure at the end of 1935-36 amounted to £136,386,000 including £49,515,000 by municipalities and £4,593,000 by the J.E.A. Of the total 30.6 per cent. was accounted for by generation, 54.6 per cent. by transmission and distribution and 14.8 per cent. by apparatus on hire and miscellaneous items.

Working costs were £16,649,000 (0.63d. per kWh sold), included in which was £12,940,000 (0.49d. per kWh sold) for generation and energy purchased. The corresponding local authority figures were 0.73d. and 0.52d., company 0.48d. and 0.59d., and the J.E.A. 0.44d. and 0.54d.

The gross surplus on working amounted to £3,881,000 for municipalities, £7,731,000 for companies and £316,000 for the J.E.A. Municipalities appropriated £952,000 for interest and £1,571,000 for sinking and repayment funds, £326,000 for income tax, £592,000 for capital outlay and special expenditure, £319,000 for depreciation and reserve and £134,000 for relief of rates.

After allocating £1,521,000 in respect of interest, the companies paid £636,000 to preference and £2,230,000 to ordinary shareholders, and transferred £3,209,000 to depreciation and reserve; income tax absorbed £139,000. The J.E.A.'s surplus was divided nearly equally between interest and sinking funds and some £4,600 was applied to capital outlay. Local rates paid amounted to £1,626,000 (municipal undertakings £490,000) compared with £489,000 in 1925-26.

The volume furnishes particulars for each undertaking of its Acts or Orders, system of supply, plant installed, fuel consumption, output for various uses and other statistics. The latter include figures relating to capital expended, revenue and working costs, bulk supplies and a table showing the growth in kWh sold by individual undertakings over five years compared with the position in 1913-14, when the output was less than one-eighth of what it was in 1935-36. As an appendix is included the statement of published tariffs in force at January 1st, 1937, which was recently reviewed by us when it appeared as a separate document.

Electricity Supply

Lighting, Domestic, Power

Ashford (Kent).—DECORATIVE LIGHTING.—Several years ago the Corporation floodlighted the fountain in Victoria Park, but the scheme was not very successful because the lamps were placed in front of the fountain. For the Coronation, however, with the projectors at the back of the fountain and set at an angle of about 45 deg., a very excellent effect was obtained. The water appeared to be coloured red, white and blue. Mr. H. Wilson, electrical engineer to the U.D.C., informs us that when the fountain, which was made somewhere abroad and was displayed at a Franco-British Exhibition, was first set up in its present position in Victoria Park only a 4-in. water-main was available. This main did not deliver enough water to produce any good effect and, incidentally, deprived the southern portion of the town of a supply. Soon after the Electricity Department came into being the Council, on its advice, decided to make a self-contained unit of the fountain by putting in a 20-h.p. centrifugal pump so as to keep the water in circulation from the basin to the jets. The pump was arranged to deliver 30,000 gal. per hr., and the fountain now gives a good display. Wye Crown was also illuminated by the Department for the Coronation. This crown is cut in the chalk downs. Measuring approximately 50 yd. by 50 yd., it is a landmark for many miles around. It was illuminated by 800 25-W amber lamps hung on fencing wire supported by hedge stakes, and electricity had to be obtained from the nearest supply point about 700 yd. away. When lighted the crown appeared to be floating in the sky.

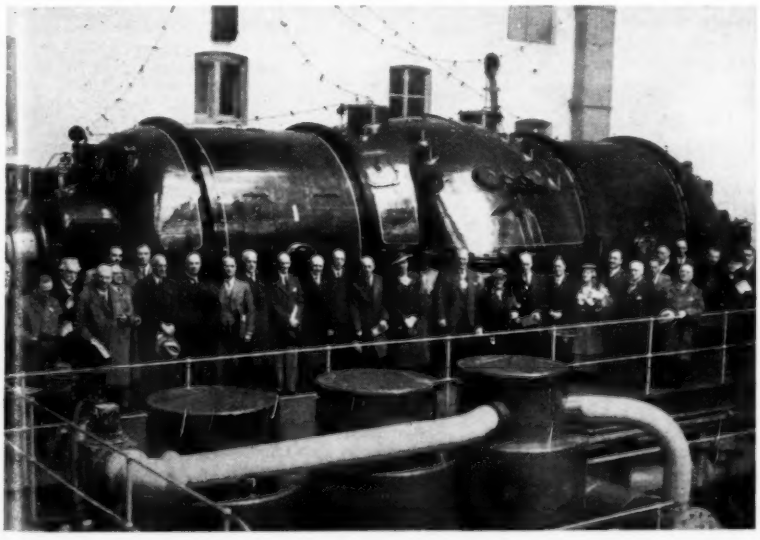
Ayrshire.—POWER STATION EXTENSIONS.—Mr. Bryce, chairman of Ayrshire Electricity Board, in a statement to Kilmarnock Town Council recently, said that the Board had received from the Central Electricity Board a request to prepare a scheme for the installation at the Kilmarnock power station of a 30,000-kW generating set. This scheme had been prepared and submitted by the manager. They had now been asked to prepare a larger scheme, comprising two other 30,000-kW sets, the first to be ready by 1942 and the other by 1946. The estimated cost of the smaller scheme was £350,000, while if the larger scheme were approved the capital sum involved would probably be in the vicinity of £1,000,000.

Bedford.—MAINS.—The Electricity Committee is to extend its mains at a cost of £2,762.

Belgium.—ELECTRICITY UNDERTAKINGS AS STEAM SUPPLIERS.—Good progress is being made by the Société Intercommunale Belge d'Electricité with the construction at Verviers of a special station for the supply of steam to the textile factories in the district, and it is expected that the plant will be in operation before the end of the present year.. In a recent report the Intercommunale directors state that contracts for the supply of steam, which will absorb practically the whole of the available output, have already been secured.

Brierfield (Lancs).—COMMERCIAL TARIFF.—A special tariff of ½d. per kWh for electricity used for commercial purposes between 9 a.m. and 12 noon has been adopted by the Electricity Department for a period of six months as an experiment.

Brighton.—NEW PLANT INAUGURATED.—The new boiler and turbine plant at the Corporation's Southwick power station (see full description in last week's issue, page 755) was formally inaugurated last Friday, when the Mayoress, Mrs. J. Routley, started up the new 37,500-kW Brush-Ljungström turbo-alternator. Members of the Brighton Corporation and representatives of the electricity supply industry were received at the power station by Councillor M. W. Huggett, chairman of the Electricity Committee, who also presided at a luncheon held at the Hotel Metropole after the ceremony. In response to the toast, "The Brighton Corporation and its electrical supply," proposed by Mr. George Summers, director and general manager of the Stirling Boiler Co., Ltd., the Deputy-Mayor, Councillor E. Denne, declared that the inauguration of the new plant represented a landmark of further progress of the electricity undertaking. The turbine was the first unit of its capacity and operating under high steam pressure of 650 lb. per sq. in. gauge and temperature of 850 deg. F. built in this country. A similar machine was in course of manufacture for further extensions. The boiler was capable of evaporating 180,000 lb. of water per hr. at the pressure of 675 lb. per sq. in. gauge and was arranged to burn efficiently 10 tons of coal per hour. They were justly proud of the station, for in five years its capacity had been increased from 49,525 to 100,000 kW, the units generated from 85 millions to 243 millions per annum, and the number of consumers from 27,262 to 45,362. By installing the new plant Brighton was possibly setting a fashion in turbine development. In proposing the health of "The Contractors," Mr. W. N. C. Clinch, the borough electrical engineer and manager, mentioned that £185,000 had been spent on the extensions and expressed the opinion that the Southwick station led the country on the right lines of development. He paid high tribute to the work of his predecessor, Mr. John Christie, in the early days of the undertaking's history. Mr. H. Ewbank, chief engineer of Edmundsons' Electricity Corporation, Ltd., and Mr. H. E. Midgley, chairman of the Brush Electrical Engineering Co., Ltd., both complimented the Corporation upon its enterprise.

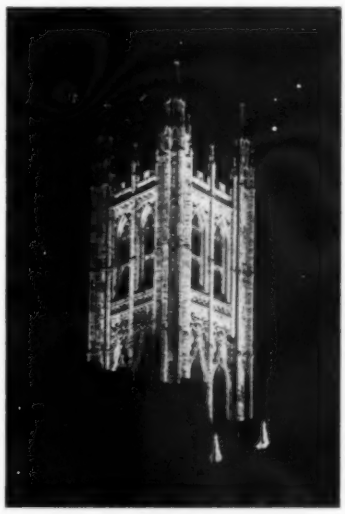


Members of the Brighton Corporation and officials in front of the new 37,500-kW Brush-Ljungström set at the Southwick power station

SUB-STATIONS.—The Electricity Committee is to erect and equip sub-stations in Appledore Road, East Moulsecoomb (£2,617) and Mill Road, Southwick (£2,837).

Burton-on-Trent.—WORKSHOPS.—The Electricity Committee is to erect workshops at Church Croft at an estimated cost of £680.

Canterbury.—CATHEDRAL FLOODLIGHTING.—The 235-ft. high Bell Harry Tower of Canterbury Cathedral, floodlighted for the Coronation, was visible for miles around. For the installation, by H. M. Biggleston & Sons, sixteen projectors manufactured by the Electric Street Lighting Apparatus Co. were used, with 1,000-W gas-filled lamps. Callender twin 7/0.044-in. t.r.s. cable was employed.



Canterbury Cathedral tower floodlighted for the Coronation

Cardiff.—MAINS.—The Electricity Committee is to extend its mains at a cost of £2,761.

Chester.—MAINS AND SERVICES.—Sanction is being sought by the Electricity Committee to a loan of £30,000 for mains and services.

SUB-STATION.—The Electricity Committee is to erect a sub-station in the vicinity of City Road.

Chesterfield.—PROSPEROUS ELECTRICITY UNDERTAKING.—The quantity of electricity sold by the Electricity Department, of which Mr. D. H. Davies is engineer, during the year ended March 31st last was again a record at 20,187,596 kWh. This is an increase of approximately 10 per cent. on the output for 1935-36. The largest expansion was under the domestic combined rate for lighting, heating and cooking (26 per cent.). Although the price paid per ton of fuel increased by 22 per cent., the operating costs, at 0.73d. per kWh, were actually lower. Over 80 per cent. of the output was generated by the Corporation's own plant at Chatsworth Road, but as the Electricity Commissioners decided two years ago that the station should not be extended all the additional load will have to be met by bulk supply from the Derbyshire and Nottinghamshire Electric Power Co. The average price obtained for private lighting was just over 3d. per kWh and for domestic purposes, under the two-rate system, 0.73d. per kWh. The price received from the large power consumers was 0.72d. per kWh and from the trolley-bus section 0.74d. The average price for all supplies

was 1.19d. per kWh. Despite the low charges, a profit of £10,844 was made on a total revenue of £107,495. This is the second largest profit ever made by the undertaking. General reductions in charges, amounting to £8,729 in a full year, were adopted as from January last, and it is now proposed to abolish prepayment as well as ordinary meter rents, which will mean an additional concession of approximatey £2,400 per annum. The undertaking has accumulated reserves amounting to over £36,000. An additional 653 consumers were connected to the mains during the year. The total number is now 16,588, representing over 94 per cent. of the whole of the premises in the borough. The number of workmen's houses connected under the hired wiring scheme is 8,582. There were at the end of March 15,945 pieces of domestic electrical apparatus connected, including 1,247 cookers, 4,161 fires, and 342 wash-boilers and water heaters.

Colwyn Bay.—AMALGAMATION FAVOURED.—It has been decided to inform the North Wales and South Cheshire Local Authority Electrical Undertakings Association that the Colwyn Bay Lighting Committee is in favour of the proposed amalgamation of municipal undertakings in North Wales with a view to the constitution of a joint board.

Cullen (Aberdeenshire).—ELECTRIC STREET LIGHTING.—The Town Council has adopted a recommendation of the Special Lighting Committee that the streets of the burgh shall be lighted by electricity.

Essex.—SCHEME FOR GROUPING UNDERTAKINGS.—The West Ham Electricity Committee has considered the proposals for the reorganisation of electricity distribution circulated by the Ministry of Transport and favours a scheme for the grouping of the West Ham, East Ham, Ilford, Walthamstow, Leyton and Barking undertakings.

Exeter.—MAINS AND SERVICES.—Sanction has been obtained by the Electricity Committee to a loan of £30,000 for mains and services.

Falkirk.—COOLING TOWER.—Consideration is being given to a scheme for the replacement of the small cooling tower at the generating station by a new tower at an estimated cost of £1,000, and the replacement of two existing 500-kW generators either by a 1,000-kW or a 3,000-kW unit, subject to the approval of the Electricity Commissioners.

Guildford.—MAINS.—The Electricity Committee is to extend mains at a cost of £3,585.

Guisborough.—STREET LIGHTING.—Following the inspection by the electrical engineer and members of the Council of sodium and mercury electric-discharge lighting, the Council has agreed to the installation of the sodium system of public lighting in Bolcknow Street.

High Wycombe.—CHEAPER ELECTRICITY.—The Wycombe (Borough) Electric Light & Power Co., Ltd., has reduced the price of electricity as under, as from the date of the meter readings for the quarter ended March 31st last: Lighting flat rate, reduced to 6½d. per kWh; small power rate, first 500 kWh per quarter, 2½d. per kWh, next 4,500 kWh at 2d., all in excess of 5,000 kWh at 1½d.; business two-part tariff, a "unit" charge of ¾d. for all electricity used, and a fixed charge of 24s. per annum for each 100 W of lamps connected. The present domestic two-part tariff will be withdrawn and the following revised and reduced tariff introduced as from the meter readings for the quarter ending June 30th: Running charge of ¾d. per kWh for all electricity used, with a fixed charge based on floor area.

Ilford.—STREET LIGHTING.—Orders to the value of £5,274 for the necessary equipment for lighting the trolley-bus routes with electric-discharge lamps have been placed by the borough electrical engineer.

ELECTRICITY REPLACES GAS.—During the last month electricity has replaced gas in nineteen houses, services having been extended in 884 premises. In no case has gas replaced electricity.

HIRE-CHARGES.—The following revisions in hire-charges have been adopted by the Council: Quarterly charges for immersion heaters and wiring reduced from 5s. to 2s. 6d.; for 1½-gall. storage heaters and wiring, from 3s. 6d. to 2s. 6d.; and for 3-gall. storage heaters and wiring, from 4s. 3d. to 3s. 6d.

Kent.—LAUNDRY EQUIPMENT.—Electric laundry apparatus is to be installed by the Health Committee of the County Council at Lyminge Institution at a cost of £993.

SUPPLY TO SANATORIUM.—The Health Committee is to take immediate steps with a view to a supply of electricity being made available at Lenham Sanatorium.

London.—FULHAM.—Owing to the increased load an additional sub-station has become necessary in the vicinity of Munster Road and Kingswood Road. The cost is estimated at £1,862. In connection with the building of the proposed sub-station the opportunity arises of making modifications to the cable system between this sub-station and the surrounding areas, enabling the small feeders, installed many years ago, to be replaced with others of adequate capacity. The estimated cost of the proposed modifications is £2,242.

HAMPSTEAD.—The 1936-37 statement of accounts of the Electricity Department gives the total net revenue as £213,035, against £198,782 in the previous year. Working expenditure was £189,795 (£169,538), and the gross profit £23,240 (£29,244). After deducting £1,419 interest there was a net profit of £21,821 (£28,793). At the end of the financial year the undertaking had an aggregate credit balance of £57,457. The number of consumers was 24,675 (23,440), the total sales being 41,985,000 kWh (38,432,000 kWh). The load factor was 24.10 (22.32).

STEPNEY.—The Council last month authorised the purchase of 100 1½-gall. water heaters to be offered to consumers experimentally on hire terms. The Electricity Committee states that it is too early to advise as to whether the Council would be justified in embarking upon a scheme for the general hire of water heaters, but in view of the immediate demand for this type of apparatus it recommends that a further 50 heaters shall be purchased.

At its meeting on Wednesday the Council appointed delegates to attend a conference to discuss the proposals for the reorganisation of electricity distribution. Representatives of the Bethnal Green, Hackney, Poplar, Shoreditch and Stoke Newington Councils, which, with Stepney, it is proposed shall constitute one of the groups to be formed, are also to attend.

Lowestoft.—CHEAPER ELECTRICITY.—The charge for electricity for lighting at Lowestoft is to be reduced from 4¾d. to 4½d. per kWh, and that for outside and shop-window lighting from 3d. to 2d. Reductions are also proposed in the power charges and in the two-rate tariff for dwelling-houses, while an optional two-rate tariff is to be applicable to shop lighting.

Malvern.—TWO-PART TARIFF.—The following two-part tariff is now available to consumers for domestic purposes: A fixed charge of 20 per cent. of the net rateable value of the premises per annum, payable quarterly, with all electricity consumed charged at 1¼d. per kWh, less 7½ per cent. discount for prompt settlement of accounts.

Neilston.—PUBLIC LIGHTING.—The Council has accepted the tender of the Clyde Valley Electrical Power Co., amounting to £1,786, for public lighting.

Newcastle-under-Lyme.—VOLUNTARY AMALGAMATION SCHEME OPPOSED.—A special meeting of the Council was held last week to consider a resolution passed by the North-West Midlands Joint Electricity Authority, recommending the submission to the Electricity Commissioners of a voluntary scheme for the amalgamation of all undertakings in the North-West Midlands District, including the area of the Trent Valley and High Peak Co. The Mayor (Alderman S. Myott), who is chairman of the Electricity Committee, reported that at a meeting of representatives of the smaller undertakings in the area, it was unanimously decided that, in view of the contents of the Government's "White Paper," it was neither advisable nor opportune to enter into or discuss any form of amalgamation in the area. Further, that in order to meet the requirements of the report of the Engineers' Technical Committee of the area on the McGowan Committee's recommendations, the constitution of the J.E.A. should be revised so as to create a supervisory body for the whole area. The Mayor said that there were three bases in the Government's proposals, the third providing for the formation of one or more authorities in a joint board. They in Newcastle would rather see this basis modified so that, instead of having a joint board which would take away the identity of the several undertakings, they would have a co-ordinating and consultative regional committee with statutory powers to be given by Parliament, each authority being equally represented on such committee. They thought something of the nature might satisfy the Minister of Transport and bring about everything he desired. The Council then approved the report of its Electricity Committee, in which it was recommended that the J.E.A.'s proposal should not be approved; that the proposals contained in a report of the Engineers' Technical Committee should be approved; and that agreement should be expressed with the resolution passed at the meeting of the smaller undertakings in the area.

New Silksworth.—SUB-STATION.—The North-Eastern Electric Supply Co., Ltd., is to erect a sub-station near Vicarage Farm.

Preston.—SIMPLIFIED CABLE-LAYING.—Experiments have been carried out with a new type of plough, operated by a tractor, which cuts a trench 1 ft. deep and 8 in. wide. Wayleaves are cheaper, farmers' organisations recommending their members to help the Corporation by granting a wayleave of 2s. 6d. per annum for an owner's land irrespective of the length traversed.

Rookhope (Durham).—SUB-STATION.—The North-Eastern Electric Supply Co., Ltd., is to erect a sub-station in Chapel Row.

Sedgley.—SUB-STATION.—The Midland Electric Corporation is to erect a sub-station in Eve Lane.

Swansea.—ELECTRICITY SUPPLY.—An electricity supply is required by the Co-operative Wholesale Society, Ltd., in connection with a project for the establishment of a new provender mill at King's Dock, Swansea. The Electricity Committee proposes to provide the supply, at a cost of £11,015.

TARIFF CHANGES.—The borough electrical engineer has recommended that the existing heating tariff for the supply to cinemas shall be applied as a commercial heating tariff for the supply of electricity for heating purposes to places of worship, public buildings, business and industrial premises.

Traction

Bradford.—TROLLEY-BUS SCHEME.—After a meeting of the Transport Committee on Monday, the chairman stated that agreement had been reached between the Corporation and the Bingley and Shipley Urban District Councils for the substitution of trolley-buses for the trams on the route to Crossflatts.

Liverpool.—NEW TRAM ROUTE.—The City Council will be asked at its next meeting to authorise the construction of the new Muirhead Avenue East tramway, at an estimated cost of £21,400.

London.—UNDERGROUND EXTENSION.—C. Brand & Son, Ltd., contractors to the London Passenger Transport Board in connection with the Liverpool Street to Bow Road underground railway extension, have applied to the Stepney Council for an extra-high-voltage supply at Mile End station for the purpose of their operations. They have agreed to a proposed tariff quoted by the borough electrical engineer and manager and have also expressed their willingness to pay to the Council an agreed sum as a contribution towards the cost of the necessary equipment and the laying of feeders.

Portsmouth.—ILLUMINATED TROLLEY-BUS.—In connection with the Naval Review celebrations one of the Transport Department's trolley-buses was picturesquely illuminated. Over

A Portsmouth trolley-bus decorated for the Naval Review

2,000 lamps were required, all being of the Siemens traction type in various colours. The photographs of the King and Queen were also illuminated.

Southern Railway.—ELECTRIC SERVICE TO PORTSMOUTH.—Although the through electric service from London to Portsmouth is not due to commence until the summer services are begun, several electric trains were run last week to cope with the heavy traffic occasioned by the Naval Review at Spithead.

Sunderland.—NEW TRAMS.—The Town Council is to purchase three more tramcars at a cost of £9,500.

Communications

Austria.—TELEPHONIC COMMUNICATION BETWEEN INTERCONNECTED POWER STATIONS.—In *Elektrotechnik und Maschinenbau* Herr B. Kleebinder gives a description of the methods adopted in Austria of using electric power transmissions lines for high-frequency telephonic communication between interconnected power stations and the steps which have been found necessary to overcome atmospheric disturbances. He states that there are now thirty-one such installations in use in Austria, operating over about 560 miles of transmission lines (35 to 100 kV, with one section at 220 kV).

France.—TELEPHONY.—New telephone cables for the French Post and Telegraph Authorities have recently been completed by the Société des Lignes Télégraphiques et Téléphoniques between Paris and Metz; Paris and Le Mans; La Roche-sur-Foron and Megeve; and Chauny and Rheims.

INSTALLING TELEVISION CABLE AT EIFFEL TOWER.—Last week one end of a 12-ton television cable made in Germany was hauled to the top of the Eiffel Tower. The cable is 405 metres long and 30 centimetres in diameter. The core consists of plaited copper strips with steatite insulators placed at intervals.

Great Britain.—AUTOMATIC TELEPHONY.—On Saturday the telephone system at Doncaster was changed over from manual to automatic operation, about 3,000 lines being affected. Manual operation has also given place to automatic at Thornton Heath, where the ceremony was to take place on Wednesday.

POLICE RADIO SYSTEM.—Several of the Lancashire and Cheshire police forces are co-operating in the operation of a system of wireless communication on a regional basis. The chief constable of Manchester, in his annual report, states that progress on the experimental side continues to be satisfactory, and in 1937 further vehicles belonging to the various forces in the region are scheduled to be fitted with radio receiving apparatus. It is possible that during the next two years every police vehicle within the area will be so equipped. Experiments were made in the use of telephony instead of telegraphy, but the results, while satisfactory when working from one fixed point to another, were not so good on moving vehicles. Inquiries were received from forces who are at present outside the regional wireless scheme, and there is a likelihood of these forces joining the scheme, making a complete network of radio-equipped vehicles and stations operated and controlled from the regional station at Heaton Park.

TELEVISION CABLE EXTENSIONS.—The television cable used to transmit pictures of the Coronation procession has been extended, states the *Daily Telegraph*. The object is to enable television transmissions to be made from London theatres and from Covent Garden Opera House. At the outset it is proposed to televise the arrival of celebrities and give illustrated commentaries from the foyers, etc. A line along the Embankment also makes it possible to televise City ceremonies.

United States.—LINK WITH CHINA.—A direct radio-telephone link with China was inaugurated last week by the Secretary of State, Mr. Cordell Hull, who spoke to the Chinese Minister for Foreign Affairs at Shanghai.

Japan.—TOKIO.—*Reuter* reports from Tokio that the overhead telephone and telegraph wires in the capital are to be replaced by underground cables.

Indian Electrical Notes

THE supply of electricity in the Delhi province has been in a confused state owing to the operation of three separate agencies, and some time ago the Government of India appointed a committee to investigate the matter and to make recommendations. This committee has now submitted its report, in which it recommends that electricity generation shall be taken over by a central authority established on a no-profit basis. It is proposed that this central authority shall be empowered to supply energy direct in bulk to large consumers, who will be represented on the managing body. By centralising generation a considerable reduction in the cost of power production is anticipated, with a corresponding benefit to the consumer. It is estimated that the whole scheme of development will require a capital provision of Rs.46 lakhs, and after calculating the probable increase in demand and the reasonable rates to be charged it is expected that there will be a net surplus revenue of Rs.76,000. The committee makes the additional suggestion that if the Delhi load is connected with the Punjab hydro-electric system the capital cost of the scheme would be reduced to Rs.26 lakhs. It emphasises that even if no other changes are made the suggestion for constituting a central generating authority should be given effect to at once, and it is understood that the Government is favourably disposed towards this recommendation.

All-India Radio has issued details of general requirements for three representative types of receivers which would be suitable for Indian conditions. The first of these has been termed the "local receiver," which is intended for picking up the local medium-wave stations and, under favourable conditions, other medium-wave stations operating on wavelengths between 200 and 550 metres. The set should have four valves and be suitable for operation on a.c. or d.c. mains. This set must be of a moderate cost. The second type of receiver, called the "all-India receiver," is required to cover both the medium and the short wavebands which will be used in India. Three ranges should be provided, namely, 25 to 42 metres, 40 to 100 metres, and 200 to 550 metres. Such a receiver should be of the four-valve superheterodyne type and be suitable for operation on a.c. or d.c. mains. The third, or "all-wave receiver," is the standard type at present available. For Indian conditions, however, it is essential that it should be capable of picking up a minimum wavelength of 13 metres, and the wave-range from 13 to 550 metres should be covered continuously without gaps. Receivers at present available in India fail to meet some of the requirements specified.

After extensive listening tests by the research department of All-India Radio with a view to finding wavelengths for its new stations which would be free from interference at night from distant European medium-wave stations the following have been chosen:—Medium waves: Trichinopoly, 397 metres; Delhi, 340; Lucknow, 295; Bombay, 244; Calcutta, 235; Lahore, 275; Dacca, 257; Madras, 211; and Peshawar, 200. The new short-wave stations will operate within the following wavebands: 25, 31, 49, 60 and 90 metres. None of the Indian stations will operate on the long waves.

From the accounts of the sea-borne trade of India for the fiscal year 1936-37 which are now available it is seen that the imports of electrical machinery into India during the year amounted in value to Rs.255 lakhs, as against Rs.205 lakhs in the previous year. This increase chiefly occurred in the supplies from the United Kingdom, which advanced in value from Rs.137 lakhs to Rs.179 lakhs. Germany's share also rose from Rs.29 lakhs to Rs.37 lakhs. Imports of electrical goods and apparatus amounted to Rs.303 lakhs, a slight decline compared with imports in the previous year. The share of the United Kingdom fell from Rs.175 lakhs to Rs.170 lakhs and of the Netherlands from Rs.13 lakhs to Rs.5 lakhs. Germany's share rose from Rs.37 lakhs to Rs.42 lakhs. The imports of electric wires and cables were valued at Rs.93 lakhs, the same as in the previous year.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Aberdare.—June 14th. U.D.C. Electricity Department. Transformers, e.h.v. switchgear and e.h.v., p.i., l.c. cable. (See this issue.)

Ardrossan (AYRSHIRE).—June 7th. Town Council. Electric lighting at 102 houses. Joint town clerks, Burgh Chambers (deposit £1 1s.).

Argentina.—BUENOS AIRES.—June 23rd. Sanitation Works Department. Electric deep well and booster pumps. (T.Y. 2580.)*

Australia.—BRISBANE.—July 5th. City Electric Light Co. Relays to replace those existing at four sub-stations. (T.Y. 31392.)*

MELBOURNE.—July 6th. State Electricity Commission of Victoria. One 30,000-kVA and one 10,000-kVA synchronous condensers and accessory plant. (T.Y. 31388.)*

July 20th. 1,500-kW static or rotary rectifier plant. (T.Y. 31387.)*

Aylesbury.—May 31st. Town Council. One electric a.c. motor and centrifugal pump, fitted with automatic switchgear, for pumping unscreened crude sewage at the California pumping station. W. H. Taylor, borough engineer, Town Hall (deposit £2 2s.).

Barnoldswick.—May 31st. U.D.C. Electricity Department. Sheet steel kiosk, complete with transformer, and poles and steel work for 6.6-kV line. (May 21st.)

Barrow-in-Furness.—June 14th. Gas and Water Committee. Two electrically driven multi-stage centrifugal pumps (75-gal. per minute each against a head of 140 ft.), with automatic switch and control gear, &c. Engineer and manager, Gas and Water Department, Salthouse Gasworks (deposit £1 1s.).

Bexley.—June 21st. U.D.C. P.i. underground cables for one year. (See this issue.)

Birmingham.—June 7th. Electric Supply Committee. Cable jointing compound for one year. (May 21st.)

Blackpool.—June 8th. Electricity Department. 6.6-kV switchgear, modifications at two cubicles, and one portable oil filter plant for transformer and switch oils. (May 14th.)

June 22nd. Borough Council. Electrically driven passenger lift (to carry twenty-five persons), in the North Shore lift tower. Borough Surveyor's Office, Municipal Buildings, Talbot Square (deposit £1).

Bredbury and Romiley.—June 7th. U.D.C. Electricity Department. L.v. and h.v. p.i. cables for the period ending April 30th, 1938. (May 21st.)

Bristol.—June 21st. Health Committee. L.v. underground cables, switchgear, &c., at Ham Green Hospital, Pill, and electrical services in a nurses home and three maternity ward blocks at Southmead Hospital. (See this issue.)

Croydon.—June 9th. Electricity Department. Stores and materials for twelve months. (May 21st.)

Dunfermline.—June 4th. Town Council. Electric lighting in seventy-two houses at Kingseathill. D. H. Shaw, burgh engineer, City Chambers (deposit £1).

Eccles.—May 31st. Electricity Supply Committee. Single-phase a.c. house service and prepayment meters for twelve months. Borough electrical engineer, Electricity Offices, 1, King Street.

Egypt.—CAIRO.—June 15th. Ministry of the Interior. Equipment for the electrification of the Zagazig drainage section. (T.Y. 31370.)*

Fife.—Joint Asylum Committee. Electrical apparatus and steam generating plant for the Fife Joint Asylum, Springfield. Ramsay and Primrose, consulting engineers, 172, Pitt Street (North), Glasgow, C.2 (deposit £2 2s.).

Finchley.—May 31st. Education Committee. Rewiring the electrical installation at the Alder Council school. C. R. Westlake, borough electrical engineer, Squires Lane, Finchley, N.3 (deposit £1).

Great Crosby.—May 31st. U.D.C. Four electrically driven centrifugal pumps of 1,850-cu. ft. per minute capacity, with ancillary plant, &c. Howard Humphreys & Sons, 17, Victoria Street, London, S.W.1 (deposit £5 5s.).

Inverness.—June 2nd. Town Council. Electric lighting works in 100 houses at South Kessock. W. Smith, architect, 52, High Street.

Irish Free State.—DUBLIN.—June 26th. Electricity Supply Board. Boiler plant and auxiliaries at the Pigeon House generating station. (May 21st.)

Littleborough.—June 15th. U.D.C. Electricity Department. One three-cubicle e.h.v. switchboard, one truck type l.v. switch cubicle, one l.v. metering and neutral panel, and one distribution pillar. (See this issue.)

London.—ACTON.—June 4th. Town Council. Installation throughout the borough of a fire alarm and ambulance call bell system in connection with the erection of a new fire station. H. C. Lockyer, town clerk, Municipal Offices, Acton, W.3.

METROPOLITAN WATER BOARD.—July 1st. Two sets of electrically driven centrifugal pumps at the Hammersmith pumping station. Chief engineer, Room 235, Offices of the Board, 173, Rosebery Avenue, E.C.1 (deposit £2 2s. to the Comptroller of the Board).

EALING.—June 2nd. Borough Council. Electrical materials for twelve months. (May 21st.)

HAMMERSMITH.—June 11th. Borough Council. E.h.v. and h.v. switchgear. (May 21st.)

STOKE NEWINGTON.—June 1st. Borough Council. Rising mains in four blocks of flats. (May 21st.)

WEST HAM.—July 2nd. Borough Council. Electrical installation in a new Colony for Mental Defectives, South Ockendon. (See this issue.)

WANDSWORTH.—June 28th. Borough Council. Wiring of houses, flats and maisonettes. (See this issue.)

Manchester.—June 4th. Electricity Committee. Pipework for fire pump, &c., and stand-by ash handling plant and modifications to gravity bucket coal conveyors at the Barton power station. (May 21st.)

Middlesex.—June 21st. County Council. Electrical installation at the new elementary school, Hibbert Road, Harrow Weald. (May 21st.)

Monifieth.—June 7th. Town Council. Electric lighting installation at housing estates. C. A. Mackenzie, burgh surveyor.

Northern Ireland.—BELFAST.—May 31st. Electricity Committee. Coal for twelve months at the Harbour power station. (May 21st.)

June 14th. Mercury arc rectifier equipment and additions to timber wharf and crane rail siding. (See this issue.)

June 7th. Harbour Commissioners. One 7-ton level luffing electric crane at the Donegall Quay. Harbour engineer, Harbour office.

May 31st. Tramways Committee. Trolley-bus overhead line material for the Falls Road route. General manager and engineer, Corporation Tramways, Sandy Row (deposit £2 2s.).

Nottingham.—June 8th. Electricity Committee. General stores for twelve months. (May 14th.)

Nuneaton.—June 11th. Electricity Department. Kiosk substation, with e.h.v. and l.v. switchgear and 200-kVA transformer. (See this issue.)

Rhondda.—June 26th. Electricity Committee. Three-phase static transformers. (See this issue.)

Shropshire.—May 31st. County Council. Electric power plant, comprising transformer and four motors (aggregating 132 h.p.), lighting, &c., at the Council's quarry, Nills Hill, Pontesbury. W. H. Butler, county surveyor, County Buildings, Shrewsbury (deposit £2).

South Africa.—PORT ELIZABETH.—June 10th. Municipality. Electric lighting fittings and plug and switch units for the Elizabeth Donkin Infectious Diseases Hospital. (T. 31374.)*

Tiverton.—June 5th. Town Council. Overhead and underground lines. (See this issue.)

West Hartlepool.—June 15th. Borough Council. Twelve months' supply of h.v. and l.v. cables. (See this issue.)

Wolverhampton.—June 29th. West Midlands Joint Electricity Authority. Cables. (May 14th.)

* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Bedford.—Electricity Committee. Recommended. Extension of existing contracts for a further twelve months: Transformers.—British Electric Transformer Co. Cookers.—Revo Electric Co.; Jackson Electric Stove Co. Cutouts.—Henley's. Kettles.—Drake & Gorham (Wholesale). One 2,000-V transformer kiosk (£438).—B.T.H. One 6,600-V transformer kiosk (£470).—Crompton, Parkinson.

Bexhill.—Electricity Committee. Accepted. Ring main insulators and switch fuse units (£262).—A. Reyrolle & Co. 200-kVA (£153) and 300-kVA (£187) transformers.—Lindley Thompson Transformer & Service Co.

Birkenhead.—Electricity Committee. Accepted. Wiring forty nine houses (£208).—Park Electric Co. Two switch units (£197).—Ferguson, Pailin. Switchgear at sub-stations: Singleton Avenue (£834).—G.E.C.; King's Lane (£570).—Crompton, Parkinson.

Water Committee. Accepted. Electrically operated valve and electrical tripping plant for the waterworks (£388).—Glenfield & Kennedy.

Brighton.—Electricity Committee. Accepted. 103 street lamps in Portslade (£1,894).—Brighton Lighting & Electrical Engineering Co. Feed valves (£1,315).—Dewrance & Co. Boiler feed water piping (£2,736).—Stewarts & Lloyds. Contactor gear (£1,008).—Allen West & Co.

Cardiff.—Electricity Committee. Accepted. Switchgear for Roath power station (£3,722).—G.E.C. Grabbing crane (£1,420).—Priestman Bros.

Chester. — Electricity Committee. Accepted. Switchgear (£1,066).—Met.-Vick. Elecl. Co.

Dartford.—Electricity Committee. Recommended. 400-kVA transformer (£260).—Bryce, Ltd.

Glasgow.—Town Council. Accepted. Electrical work at sixty houses to be erected in Elmvale Street.—W. S. Watson, Ltd.

Hyde.—Watch Committee. Accepted. Electrical installations at premises in Corporation Street, &c. (£180).—Moult & Corbett.

Kilwinning (AYRSHIRE).—Town Council. Accepted. Electrical work at fifty-four houses (359).—J. Jamieson.

London.—ISLINGTON.—Electricity Committee Recommended. 250 fittings for the conversion of gas lamps to electricity, with Venner time switches (£5 18s. each).—Revo Electric Co.

L.C.C.—Two electric passenger lifts at the new Nurses' Home, Hammersmith Hospital:

	£		£
Evans Lifts, Ltd. Accepted ...	2,046	Bennie Lifts	2,788
Etchells, Congdon and Muir ...	2,214	J. and E. Hall	*2,822
Gimson & Co. (Leicester) ...	*2,410	Waygood-Otis, Ltd.	*2,822
W. Wadsworth & Sons ..	*2,580	Pickerings, Ltd.	*2,880
Express Lift Co.	2,666	*Tender qualified as to prices of certain materials.	
Marryat and Scott	*2,670		

Wiring and fittings for electric lighting and power at St. Mary, Islington, Hospital:

	£		£
Duncan Watson (Electrical Engineers). Accepted	658	W. J. Furse & Co. (London) ...	796
G. E. Taylor & Co.	724	Arthur Cozens	948
Gilliam and Jones	764	F. G. Edey & Co.	960
Bower Engineering Works (Electrical and General)	783	Collins Electrical	*1,192
		Grant and Blake	1,288
		* Qualified.	

Wiring and fittings for rewiring the electrical installation at nurses' home, assistant medical officers' house and stewards' house and lodge, St. Olave's Hospital, Rotherhithe:

	£		£
Reed & Sons. Accepted ...	1,176	Blackburn, Starling & Co. ...	1,285
W. J. Furse & Co. (London) ...	1,233	Arthur Cozens	1,296
Gilliam and Jones	1,276	Francis Polden & Co.	1,306
Grant and Blake	1,280		

Electric bed lift at St. George-in-the-East Hospital, Wapping:

	£		£
Marryat and Scott	*1,030	J. and E. Hall	*1,160
Express Lift Co. (Accepted) ...	1,099	Waygood-Otis, Ltd.	*1,167
Pickerings, Ltd.	1,125	* Qualified.	

STEPNEY.—Electricity Supply Committee. Recommended. Supplies for one year: D.c. prepayment meters.—Ferranti, Ltd.; Chamberlain & Hookham. Demand indicators.—Reason Manufacturing Co. A.c. ordinary, prepayment, two-part tariff and polyphase meters with demand-indicator attachments.—Aron Electricity Meter, Ltd. Conduits (£909) and troughs and covers (£528).—Albion Clay Co. Replacing the impeller of the induced-draught fan attached to No. 20 pulverised fuel boiler at the Limehouse generating station (£182).—J. Howden & Co. (Land), Ltd. Retubing of one of the feed heaters attached to the No. 8 turbo-alternator at the Limehouse station (£202).—Yorkshire Copper Works, Ltd. Plant and material in connection with the change-over of the electricity supply system from direct to alternating current.—Crompton Parkinson; A. Reyrolle & Co.; Ferranti, Ltd.; G.E.C.; English Electric Co.; Standard Telephones.

Works Committee. Recommended. Traffic control signals at the junction of Cable Street and Cannon Street Road (£1,262).—Automatic Telephone & Electric Co.

BATTERSEA.—Electricity Committee. Accepted. Twenty-four street lighting standards (£768).—Mackenzie & Moncur. Twenty-four sets of hoisting and contact gear (£96).—Engineering & Lighting Equipment Co.

Recommended. Switchgear.—J. G. Statter & Co. (£1,238). A. Reyrolle & Co. (£321); Crompton, Parkinson (£763).

HAMMERSMITH. — Electricity Committee. Recommended. 300-A, 150,000-kVA switchgear unit at the Beadon Road sub-station for controlling the interconnecting cable from the Broadway Chambers sub-station (£485).—Ferguson, Pailin. Switchgear and metering equipment (£775) and overhaul, re-equipment and installation of switchgear at "The Cottage" sub-station (£252), in connection with a supply of electricity to a new factory in Hythe Road.—G.E.C.

Southend-on-Sea. —Town Council. Accepted. Electricity meter testing equipment (£702).—Ferranti, Ltd.

Swansea.—Electricity Committee. Accepted. Rectifier equipment (£651).—Hewittic Electric Co. Feeder pillars for twelve months.—W. Lucy & Co.

Tynemouth.—Electricity Committee. Accepted. Switchgear (£415).—A. Reyrolle & Co. Transformer (£194).—Hackbridge Electric Construction Co.

Wick.—Town Council. Accepted. Electric lighting at housing estate (£174).—A. S. Addison & Co.

Forthcoming Events

Institution of Electrical Engineers *(Wireless Section).*—Saturday, May 29th. Visit to the B.B.C. Television station, Alexandra Palace. Thursday, June 10th. Visit to the Television Exhibition, Science Museum, London.

South Midland Students' Section.—Saturday, June 12th. 3 p.m. Annual summer meeting. Visit to the Droitwich Broadcasting Station, Wychbold.

Transmission Section.—Friday, June 18th, to Monday, June 21st. Visit to Holland.

Association of Supervising Electrical Engineers *(Manchester and District Branch).*—Saturday, May 29th. 33 p.m. Visit to the Hartshead generating station of the Stalybridge, Hyde, Mossley and Dukinfield Tramways and Electricity Board.

London Branch.—Saturday, May 29th. 2.30 p.m. Visit to the new Watford works of Odhams (Watford), Ltd. Saturday, June 26th. 2.30 p.m. Visit to the Pinewood Studios, Iver.

Electrical Contractors' Association of Scotland.—Friday, June 4th. to Monday, June 7th. Peebles Hydro. Annual conference.

British Standards Institution.—Tuesday, June 8th. Dorchester Hotel, London, W.1. 12.45 for 1 p.m. Annual luncheon.

Diesel Engine Users' Association.—Wednesday, June 9th. Crewe. Summer meeting.

Tramways, Light Railways & Transport Association.—Wednesday, June 9th, to Saturday, June 12th. Edinburgh. Annual congress.

Association of Mining Electrical Engineers *(South Wales Branch).*—Tuesday, June 22nd, to Sunday, June 27th. Southport. Annual convention.

Institution of Heating & Ventilating Engineers.—Tuesday, June 22nd. Summer meeting.

Electrical Contractors' Association.—Wednesday, June 23rd, to Friday, June 25th. Llandudno. Annual conference.

Illuminating Engineering Society.—Thursday, June 24th, to Wednesday, June 30th. Paris. International congress.

Notes

Illuminating Engineering Society

The annual general meeting of the Illuminating Engineering Society was held in London on May 19th. Mr. A. Cunnington (retiring president) referred to developments during the past year with regard to sectional meetings, local centres being formed in the north-western area, Glasgow and Dublin. In addition, photometry, industrial lighting and public service lighting sections were formed. Reference was also made to the satisfactory increase in membership and to the fact that incorporated in the Factories Bill now going through Parliament were legal requirements for illumination in factories. In this connection the president spoke of the considerable assistance rendered by a past president of the Society, Mr. D. R. Wilson, Chief Inspector of Factories, who had done all the preliminary work which had made the provisions with regard to factory lighting in the Factory Bills possible. The report and accounts were adopted.

Treatment of Seed by Electricity

It has been known for a long time that the treatment of seed by electricity increases the yield of crops, but the method was confined to the laboratory until the Ukrainian Grain Institute at Dniepropetrovsk, under the direction of Professor F. W. Kuperman, successfully applied the treatment on a large scale. The experiments were started some three years ago. In 1935 different sorts of electrically treated seed were sown on an area of 340 acres. Last year special stations were constructed to treat seed for the collective farms. In that year over 21,000 acres were sown with electrically treated seed. This year the area is 600,000 acres, including 150,000 acres sown with cotton, 300,000 acres with maize, 7,375 acres with potatoes and 28,300 acres with various vegetable crops. The treatment of seed by electricity not only raises the yield, but causes the crops to ripen earlier. In some cases the treatment of cotton seed by electricity is said to have increased the crop fourfold. Treated seed potatoes have yielded twice as big a crop as untreated ones.

The "Hindenburg" Disaster

According to reports from New York, Dr. H. Eckener has suggested to the American Board of Inquiry into the cause of the loss of the airship *Hindenburg* that hydrogen leaking from a gas cell was ignited by static electricity. A discharge inside the ship might have been caused by the landing rope becoming wet as a result of rain.

Manchester University Scholarships

The Manchester Education Committee offers a limited number of scholarships and exhibitions tenable in any one of the three years' full-time day courses leading to the degree of Bachelor of Technical Science (B.Sc.Tech.) at the Municipal College of Technology (Faculty of Technology in the University of Manchester). In the event of there not being sufficient Manchester students qualified to enter upon a higher course, the Committee may offer the scholarships to suitably qualified students who have no ratepayer qualification. Forms of application may be obtained by written application to the Registrar, College of Technology, Manchester, 1, before June 20th.

Appointments Vacant

Chief engineer and manager for the Mansfield electricity undertaking.

Female showroom attendant for Hoylake Electricity Department.

Assistant engineer for the County Mental Hospital, Winwick.

Fitter and fitter's mate for the Middlesex C.C.

Personal engineering assistant for Hull Electricity Department.

Mains assistant for Cannock Electricity Department.

Senior male clerks, lady shorthand typist, and lady cooking demonstrators for Finchley Electricity Department.

Telegraph inspectors for the Governments of Kenya, Uganda, and Tanganyika.

Electrician-in-charge for Tottenham Borough Council.

Mains foreman for Morley Electricity Department.

Draughtsmen for the Directorate of Technical Development, Air Ministry.

Head of the Electrical Engineering and Physics Department, Coventry Technical College.

(See our classified advertisements.)

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

VELOX vacuum cleaner.

SOLRAY electric lamps.

Readers should enclose stamped addressed envelopes when making their inquiries.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Sir Cyril Hurcomb, K.B.E., at present Permanent Secretary to the Ministry of Transport, has been appointed an Electricity Commissioner, to fill the vacancy caused by the death of Sir John Brooke, and upon the retirement of Sir John Snell at the end of the year he will succeed him as chairman of the Commission. At the request of the Minister of Transport Sir John Snell has agreed to continue to be associated for a time after his retirement with the work of the Commission in an advisory capacity. Sir Cyril Hurcomb, who was born in the year 1883, was educated at St. John's College, Oxford. He entered the Secretary's office of the Post Office in 1906, and four years later became private secretary to the Permanent Secretary, being appointed private secretary to the Postmaster-General in the following year. Subsequently he became Deputy Director, and later, Director, Commercial Services, Ministry of Shipping. He has been with the Ministry of Transport since 1927. Sir Cyril is to take up his new duties early next month.

[Elliott & Fry.
Sir Cyril Hurcomb

Ald. J. Chuter Ede, chairman of the London and Home Counties Joint Electricity Authority, and M.P. for South Shields, has accepted the invitation of Epsom and Ewell U.D.C. to be Charter Mayor.

David Brown & Sons (Hudd.), Ltd., ask us to state that the address of **Mr. F. M. Abbey,** who has been appointed district representative of the company for the Eastern Counties, is 42, Henley Road, Ipswich, and not 24 as stated in our issue of May 14th.

The Mayor of Southport **(Councillor H. W. Barber),** who is the district manager of Johnson & Phillips, Ltd., Manchester Branch, broadcast to America on May 12th, on the departure of Messrs. Dick Merrill and Jack Lambie from Southport sands on their successful return flight to New York.

Mr. C. H. Port, who is on the staff of the Weald Electricity Supply Co., has been presented with an electric kettle, electric toaster, iron and lamp by the company and staff on the occasion of his marriage to Miss O. M. Rumens, of Lamberhurst.

Mr. C. J. Strother, formerly assistant works manager, has been appointed works manager at the Chelmsford works of the Marconi Wireless Telegraph Co., Ltd. He succeeds Mr. H. A. Ewen.

Mr. G. H. Grocott informs us that he has severed his connection with Measurement, Ltd., and will shortly be taking up duties in the north of England on behalf of the British Sangamo Co., Ltd.

Mr. G. H. Grocott

Miss I. J. Ferguson, of the Northern Ireland Electricity Board, has been appointed cooking demonstrator to the Clacton U.D.C. Electricity Department in succession to Miss Nicholson, who has taken up an appointment with the Hastings Corporation Electricity Department.

Mr. J. L. Eve, of the J. L. Eve Construction Co., Ltd., has been nominated for the chairmanship of the Transmission Section of the Institution of Electrical Engineers for the session 1937-38.

Mr. J. L. H. Johnson, assistant mains engineer, Wakefield Electricity Supply Department, was the recipient of a case of cutlery and a cabin trunk presented by his colleagues on the occasion of his departure to take up the position of mains assistant to the Darwen Corporation Electricity Department.

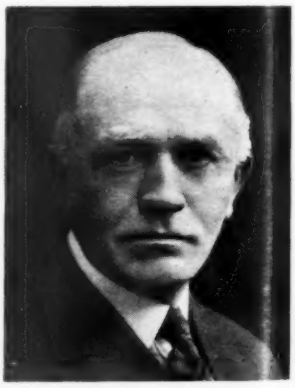
We are glad to learn that **Mr. C. Pinkham,** manager of the G.E.C. Publicity Organisation, has now been moved from hospital to his home after his recent operation. He hopes that in a week or two he will be able to go away for a period of convalescence, when, we trust, he will make a rapid recovery.

Petters, Ltd., announce that owing to age, **Sir Ernest Petter,** who is now sixty-four, and his brother, **Mr. P. W. Petter,** have found it necessary to resign from the chairmanship and vice-chairmanship, respectively, and also from the board of the company. Messrs. W. A. Phillips and T. A. Macauley and Col. J. T. C. Moore-Brabazon have also retired from the board. Messrs. A. P. Good, C. Hill and T. B. Keep have been elected directors, Mr. Good being elected chairman and Mr. Keep managing director.

Dr. J. C. Prescott, who has been appointed to the Chair of Electrical Engineering at Armstrong College, Newcastle-upon-Tyne, in succession to Professor W. M. Thornton, was educated at Liscard High School and at the University of Liverpool. He was apprenticed to the Metropolitan-Vickers Electrical Co., Trafford Park, Manchester, and towards the end of the war he was gazetted lieutenant in the R.N.V.R. and attached to H.M. Mining School, Portsmouth, where he carried out research work on submarine mines, and assisted the late Dr. G. W. Walker in investigations on explosion pressures. Upon demobilisation he was appointed lecturer in the School of Electrical Engineering in the University of Liverpool and subsequently to the additional appointment of Warden of the University Halls of Residence for Men. His publications have been concerned chiefly with the theory and operation of large machines, with special reference to the phenomena of instability in synchronous apparatus. He is at present engaged in the development of an electrical harmonic analyser for telephone work.

Dr. J. C. Prescott

Mr. J. N. Wilson, general manager of the Glasgow Transport Department, is to retire in November under the superannuation scheme. He was promoted to the position on the retirement at the end of March last year of Mr. Lachlan Mackinnon, and had previously been the deputy general manager for about seven years. Before that he had acted as secretary and treasurer of the department. Mr. Wilson has been in the service of the department since it was instituted about forty-seven years ago on the municipalisation of the tramway system. He was transferred at that time from another Corporation department. A letter from Mr. Wilson intimating his pending retirement was submitted to the Transport Committee of the Corporation at a meeting on May 19th, and a subcommittee was instructed to consider the appointment of a successor. The salary scale for the post commences at £1,500 and rises to £2,000 per annum.



Mr. J. N. Wilson

Mr. D. Adams, borough electrical engineer, Preston, is retiring towards the end of 1937 on reaching the age limit. He succeeded Mr. J. F. Simpson, to whom he was deputy, in 1934, and has been with the Corporation since it took over the electricity undertaking from the National Electric Supply Co., in 1921.

Mr. E. Dempster has resigned from the office of secretary to the Belfast Association of Engineers, and his address is now "Kingscourt," 17, Wellington Place, Belfast. He is succeeded as secretary of the Association by **Mr. J. H. R. Adams,** whose address is 8-10, Castle Arcade Buildings, Castle Arcade, Belfast.

Obituary

Mr. Magnus Volk.—The death occurred suddenly on May 20th, at his residence at 38, Dyke Road, Brighton, of Mr. Magnus Volk, whose electric railway system at Brighton brought him much popularity many years ago. He had recovered from a serious illness contracted during last autumn and was engaged in business matters down to the day before his death. He was in his eighty-sixth year. His greatest continuous electrical interest was the electric railway, which is still running (Magnus Volk, Ltd.), but another scheme which received a good deal of attention about forty years ago was his electrical "Daddy Longlegs" between Black Rock, Brighton, and Rottingdean. An illustrated article describing this scheme is published on page 792. The line which is now running was the first in Great Britain and it celebrated its jubilee on August 4th, 1933, when the Mayor of Brighton drove an electric train along the route from the Aquarium Station to Black Rock. In recent years Mr. Volk took a good deal of interest in telephone and radio matters and was for some years president of the Brighton and Hove Radio Society.

[A. J. Hamlin, Brighton

A photograph of the late Mr. Volk taken about a fortnight ago

Mr. James Hermann Field, C.S.I., late Director of Observatories in India, died at Reigate on May 19th at the age of sixty-four. He made important contributions to the development of meteorological observations in India, particularly to aerological investigation, and it was to this branch of the science that he applied his training as an electrical engineer and physicist. He was an associate member of the Institution of Electrical Engineers.

Mr. C. T. Morris.—Mr. Charles Thomas Morris, who died on May 21st at "Lansdowne," 33, Bromley Common, Kent, was for many years prior to 1920 manager of Pope's Electric Lamp Co. In August of that year, at the age of fifty, he had a paralytic seizure; he has lingered on for nearly seventeen years, devotedly cared for by his wife. His former colleagues will learn with sympathy of her loss.

Mr. E. B. Merrill.—The *Electrical World* reports the death from pneumonia of Mr. Edward B. Merrill who recently relinquished his connection with the Hydro-Electric Power Commission of Ontario, with whom he had been since 1914. He was formerly with the Westinghouse Electric & Mfg. Co., Siemens Bros. & Co., Ltd., of Woolwich, the Toronto & Niagara Power Co., and the Winnipeg Electrical Development Co.

Mr. A. Williams.—The death occurred on April 14th at Miami Beach, Flo., of Mr. Arthur Williams, who retired from the position of vice-president of the New York Edison Co., in 1928.

Will.—Sir John R. Brooke, vice-chairman of the Electricity Commissioners, left £9,174, with net personalty, £5,215.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares.

New Companies Registered

Scottish Cables, Ltd.—Private company. Registered in Edinburgh May 19th. Nominal capital £150,000. Objects: To carry on the business of manufacturers and general merchants of cables, wires and metals of every kind, &c. The subscribers are: H. N. Sporborg and R. C. G. Clarke, both of 18, Austin Friars, E.C.2.

Creda Electric Co., Ltd.—Private company. Registered May 11th. Capital, £100. Objects: To carry on the business of electrical and general engineers, &c. The subscribers are: W. J. Bamford, 112, Whitehall Lane, Northfield, Birmingham; and P. J. Wall, 27, Bridgnorth Road, Stourbridge. Solicitors: Pinsent & Co., 6, Bennetts Hill, Birmingham.

T. Conroy & Son (Platt Bridge), Ltd.—Private company. Registered May 20th. Capital, £500. Objects: To acquire the business of cycle, tricycle, radio and electrical fittings dealer and electrician carried on by T. Conroy, jnr., at 50, 52 and 54, Warrington Road, Platt Bridge, near Wigan, as T. Conroy & Son. The directors are T. Conroy and T. Conroy, jnr. (permanent managing director), both of 43, Warrington Road, Platt Bridge. Registered office: Warrington Road, Platt Bridge.

Harris & Munden, Ltd.—Private company. Registered May 20th. Capital, £200. Objects: To acquire the business of an electrical and radio engineer carried on by H. E. Munden, at Bromley, Kent. The subscribers are: W. Foss, Mulgrave Cottage, Hurlingham, S.W., and I. M. McLean, 59, Napier Avenue, S.W.6. The first directors are H. E. Munden and G. Mayes.

Brand Electro-Motive, Ltd.—Private company. Registered May 14th. Capital, £100. Objects: To carry on the business of electricians, mechanical engineers and manufacturers, workers of and dealers in electricity, motive power and light, &c. The directors are: G. Wiesner, Springfield Hotel, Springfield Mount, Leeds, 2, and two others. Secretary: G. Wiesner. Registered office: 57a, Meadow Road, Leeds.

F. J. Lloyd & Sons (Burnham), Ltd.—Private company. Registered May 20th. Capital, £500. Objects: To acquire the business of radio and electrical dealers carried on by F. J. Lloyd & Sons at High Street, Burnham. The directors are: F. J. Lloyd, High Street, Burnham, Bucks, and two others. Registered office: High Street, Burnham, Bucks.

F.M.C., Ltd.—Private company. Registered May 14th. Capital, £1,000. Objects: To carry on the business of electrical, mechanical and radio engineers, &c. The directors are: A. Kovacs, 2, Rue Ernest Lavisse, Paris; L. van den Eynde, 34 bis, Chaussee de l'Etang, St. Mande, Paris; and F. M. Charles, "Friargate," 331, Upper Richmond Road, Putney, S.W.15. Registered office: 83, Pall Mall, S.W.1.

J. A. Burrows & Co., Ltd.—Private company. Registered May 13th. Capital, £1,000. Objects: To carry on business as manufacturers and repairers of and dealers in dynamos, motors, armatures, magnetos, batteries, &c. The directors are: E. Burrows, 7, Byland Grove, Allerton; and J. A. Burrows, "Hillcrest," Granville Avenue, Newcastle-under-Lyme. Registered office: 4, Vaughan Street, Westgate, Bradford.

Loan-a-Radio (Croydon), Ltd.—Private company. Registered May 21st. Capital, £1,500. Objects: To carry on the business of wholesale and retail dealers in radio apparatus, &c. The subscribers are: M. V. Dampier-Bennett, 181, Westbourne Terrace, W.2, and L. C. Beever, 184, Kings Court, Ravenscourt Park, W.6. Registered office: 76, Strand, W.C.2.

Lightplastics, Ltd.—Private company. Registered May 19th. Capital, £500. Objects: To carry on the business of electrical engineers, electricians, suppliers of electrical apparatus and machinery, electric lamp makers, manufacturers of and dealers in advertising apparatus, &c. The directors are: L. N. Morton, The Moorings, Downswood, Epsom, Surrey, and two others. Registered office: Bush Lane House, Cannon Street, E.C.4.

Elga Products, Ltd.—Private company. Registered May 14th. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in gas and electrical fittings and appliances, &c. The subscribers are: H. de Prima Weil, 73, Basinghall Street, E.C.2; and F. A. Smith, 73 Basinghall Street, E.C.2. Solicitors: Alexander Rubens & Co., 73, Basinghall Street, E.C.2.

N.R.H.S. (Eastern Counties), Ltd.—Private company. Registered May 22nd. Capital, £5,000. Objects: To acquire the goodwill of that part of the business carried on by Great Yarmouth Radio Relays, Ltd., through and by way of agency agreements with the National Radio Hire Service, namely (inter alia) the hiring out to the general public through the said National Radio Hire Service of wireless sets and radio-gramophones, including the maintenance thereof. The subscribers are: E. Rudland, clerk, and F. H. Webb, both of 2, Bond Court, Walbrook, E.C.4. Solicitors: Linklaters & Paines, 2, Bond Court, Walbrook, E.C.

Adams Bros. (Westbourne), Ltd.—Private company. Registered May 18th. Capital, £500. Objects: To carry on the business of manufacturers, repairers and hirers of and dealers in electrical and mechanical apparatus and accessories, and in particular of wireless sets, radio sets and valves, gramophones, radio gramophones, &c. The directors are: P. S. Adams and R. Adams, both of 28, Maclaren Road, Bournemouth North. Registered office: 8, Grand Parade, Bournemouth West.

Kingsway Electricals, Ltd.—Private company. Registered May 21st. Capital, £15,000. Objects: To acquire the business of manufacturers of wireless and electrical apparatus now carried on by Kingsway Electricals, Ltd., at 3-9, Dane Street, High Holborn, W.C.1. The subscribers are: C. Russell, 137, Oakleigh Park Drive, Leigh-on-Sea, and D. W. Cornforth, "Uplands," Braiswick, Colchester. Registered office: 3-9, Dane Street, High Holborn, W.C.1.

Returns of Electrical Companies

R. Darbyshire, Ltd.—Charge on benefit of hire-purchase agreements and monies payable thereunder, dated May 6th, 1937, to secure all moneys due or to become due from the company to Martins Bank, Ltd., not exceeding £1,000.

Universal Electric Time & Telephone Systems, Ltd.—Satisfaction in full on July 13th, 1935, of mortgage dated July 26th, 1935, and registered July 31st, 1935. Notice filed May 13th, 1937.

William M. Betts, Ltd.—Debenture charged on the company's undertaking and property present and future, including uncalled capital (subject to prior debenture) dated April 27th, 1937, to secure £400. Holders: Trade & General Development Trust, Ltd., 38, Old Change, E.C.4.

Harries Thermionics, Ltd.—The nominal capital has been increased by the addition of £13,000 beyond the registered capital of £10,000. The additional capital is divided into 12,000 preference shares of £1 each and 20,000 deferred shares of 1s. each, ranking *pari passu* with existing shares.

Devon Electric & General Services, Ltd.—Mortgage on shop and premises at Topsham Road, Exeter, dated May 7th, 1937, to secure £1,818. Holder: Exeter Benefit Building Society.

Synchromatic Time Recording Co., Ltd.—Satisfaction in full on July 8th, 1936, of series of debentures authorised by resolution dated July 8th, 1933, and registered July 13th, 1933, securing £1,000. Notice filed May 13th, 1937.

Associated Electrical Industries, Ltd.—Satisfaction in full (by abandoning the issue) on April 23rd, 1937, of a trust deed authorised by resolution dated May 7th, 1917, and registered September 11th, 1917, securing £500,000 second mortgage debentures.

South Bedfordshire Lighting & Ignition Co., Ltd.—Capital, £500 in £1 shares. Return dated December 31st, 1936. 500 ordinary shares taken up. £500 paid. Mortgages and charges, nil.

Solectric, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1936 (filed March 8th, 1937). All shares taken up. £100 paid. Mortgages and charges, nil.

R.A.P., Ltd.—Capital, £16,000 in 3,000 preference and 7,000 preferred ordinary shares of £1 and 120,000 ordinary shares of 1s. Return dated August 5th, 1936 (filed March 4th, 1937). All shares taken up. £16,000 paid. Mortgages and charges, nil.

Universal Metal & Neon Works, Ltd.—Satisfaction to the extent of £150, on March 22nd, 1937, of debenture dated March 31st, 1928, and registered April 17th, 1928.

Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated March 22nd, 1937, to secure £500. Holder: John McRae, 9, Shepherds Hill, Highgate, N.6.

W. Hyman & Co., Ltd.—Mortgage on 49 and 51, Grange Road West, Middlesbrough, dated April 30th, 1937, to secure £700. Holders: Durham & Yorkshire Building Society, 52, Northgate, Darlington.

Century Lamps (London), Ltd.—J. D. Shepard, of Sentinel House, Southampton Row, W.C.1, was appointed receiver and manager on May 11th, 1937, under powers contained in instrument dated August 4th, 1936.

Rotapex, Ltd.—Capital, £5,000 in £1 shares. Return dated February 3rd, 1937. 101 shares taken up. £101 paid. Mortgages and charges nil.

City of Buenos Ayres Tramways Company (1904), Ltd.—Capital, £1,240,000 in 248,000 shares of £5. Return dated March 1st, 1937. All shares taken up. £1,240,000 paid. Mortgages and charges: £105,557.

High Vacuum Valve Co., Ltd.—Issue on May 10th, 1937, of £2,000 debentures, part of a series already registered.

City Notes

Siemens Bros. & Co., Ltd.—Lord Queenborough (chairman), in the course of his speech at the annual meeting held on Friday last, said that their shops and equipment had been extensively replanned to cope with the expanding volume of business. A revival in the demand for submarine telegraph cables had given an encouraging start to Submarine Cables, Ltd., which company was well occupied with contracts. A promising feature of this revival was the call for cable designed for carrier current systems of transmission, and during the coming summer two such cables would be laid across the North Sea to Holland; another across the Cook Strait between the North and South islands of New Zealand; a fourth across the Irish Channel and two others across the North Channel. These cables were now being manufactured or had already been completed at the works of Submarine Cables. A contract had also been secured for repairing a number of telegraph cables in the Mediterranean and in the South Atlantic. The c.s. *Faraday* had been chartered by Submarine Cables, Ltd., to lay the new Anglo-Dutch and Anglo-Irish cables now being constructed by them. In connection with the execution of contracts for e.h.v., h.v. and l.v. supply mains their plant had been working to its fullest capacity throughout the year. Their export trade in cables of this class had been well maintained, while they had had to increase the productive capacity for their distribution appliances. Regarding underground telephone cables they included among their principal orders for trunk mains, complete with loading coils, those between London, Horsham, Worthing and Chichester, Marlborough, Swindon and Oxford, an extension of their London-Marks Tey cable to Ipswich and Aldeburgh, and a trunk main of the carrier type, complete with balancing networks, between London and Oxford, which was shortly to be extended to Gloucester. They had worked in close collaboration with Electric & Musical Industries, Ltd., to meet the special needs for cables suitable for television, and had manufactured and laid an entirely new type of cable in some of the principal streets of London. They had built and equipped new shops for manufacturing new types of cables and these would shortly be available for production. The manufacture of telephone exchange equipments and apparatus had necessitated an extension of the Woolwich works and during 1936 contracts had been received from the Post Office for forty-one public telephone exchange equipments and in the same year twenty-six such installations had been brought into service. Among these was the new trunk and toll switchboard at Birmingham. The past year also saw the commencement of the manufacture of equipment for carrier current telephony and they had been entrusted by the Post Office with the supply of the whole of this equipment for the London to Oxford cable. Overseas contracts for telephone apparatus included new exchanges at Khartoum, Napier (New Zealand) and Sliema (Malta), as well as extensions of exchanges at Bangalore, Brunswick (Victoria), Mysore, Port Said, Port Elizabeth and Trinidad (Portugal). With regard to rural automatic exchanges they had 140 equipments in course of manufacture, of which forty were for abroad. Their private telephone business also showed a steady expansion, while since the beginning of the year there had been an increase in the demand for electric totalisators. The Autoflex vehicle-actuated traffic control system continued to make progress and some important contracts had been received by the Siemens and General Electric Railway Signal Co., Ltd. They were also able to report a rise in the number of ships fitted with their wireless apparatus, &c. Torsionmeters continued in demand for both home and foreign account and the business in electrical measuring instruments, thermometers, &c., was improving. A further expansion was experienced in overseas orders, but competition still left them no margin of profit, notwithstanding an increased turnover. Siemens Electric Lamps & Supplies, Ltd., had had another successful year; sales of standard Siemens lamps for general lighting purposes had been materially increased and further development had taken place in connection with "Sieray" electric discharge lamps. The new factory building was completed and this would help cope with the rising demand. This company was now marketing a complete range of domestic apliances. With regard to the prospects for the current year their order sheet for the first quarter showed a substantial increase over the corresponding period of last year, and together with the work in hand, would keep their works fully occupied. He viewed with concern, however, the rising costs of materials and labour which apart from the consequence for the home market, would have a serious effect on export business.

The Telephone Manufacturing Co., Ltd.—Presiding at the annual meeting held on May 19th Mr. F. T. Jackson (chairman and managing director) said that they had installed new plating and finishing plant of the most modern type in the industry. Their turnover during the year under review was 50 per cent. more than in 1935. The works output of completed apparatus rose steadily during 1936 as the building extensions were finished and new plant installed, and in the last six months it increased by 23 per cent. over that for the first half of the year. Contracts received in the current year showed a rise of 20 per cent., and an appreciable amount of business was in prospect. In the past year the bakelite plant has been well employed; they had kept pace with all developments with regard to plant and processes and had studied developments in the plastic industry on the Continent. They were the first telephone manufacturers to install a plant to produce their own plastic mouldings for telephone apparatus, and it was anticipated that this plant would be working to capacity during 1937. Their condenser department also experienced an increase in output during 1936, but prices for this commodity had been cut for a long time past and they could not claim that this was a profitable department. However, this position was more satisfactory than at the corresponding date last year; orders were increasing and production costs were being reduced. The clock department had made good progress and its prospects were bright. The manufacture of outdoor publicity clocks had grown considerably during the past twelve months, and owing to the special constructional requirements this work had been transferred to new premises. With regard to ancillary telephone apparatus orders in hand had been received from New Zealand and Australia for Government and railway purposes and also for home railways. Another department which had expanded was the marine telephony, and in 1936 the turnover increased by 43 per cent. The revival of various branches of the shipping industry indicated a further rise during 1937. The demand for special telephones and other apparatus which they developed and manufactured for Telephone Rentals, Ltd., was increasing. An issue of a further 240,000 shares of 5s. each to existing shareholders was proposed, making the issued capital £360,000. The shares would be offered at 7s. 6d. each in the proportion of one share for every five held.

Veritys, Ltd., held their annual meeting on May 20th, when Mr. B. C. Evans (chairman and joint managing director) said that at the extraordinary meeting held in December last he pointed out that business in 1936 had shown considerable improvement, and that every possible step had been taken to reap the advantage of improved conditions. The introduction of new capital was of great assistance to the company in this respect, as it enabled them to finance the increasing business. The result was that the value of orders in hand at December 31st was more than 100 per cent. greater than at the end of 1935. In common with all other manufacturers, however, the abnormal conditions with regard to increasing cost of labour and material had had their effect on the ultimate results, but in all the circumstances the profits were satisactory. They had decided to erect an additional factory on the present site and a start on the actual work had been made. These extensions would not be available before the end of the current year, and would be devoted mainly to the manufacture of ceiling, commercial, desk and cabin fans of every type. Additional space would also be provided for the further development of their switchgear section, and of the industrial and scientific lighting section, for which there was a good future. In the latter section they had recently introduced certain domestic appliances, and ranges of ships' fittings and ships' radiators, for which extensive orders were in hand. They had made great progress in the production of motors for marine requirements, for which they had received large contracts, and steps had been taken, by improvements to the existing works and the purchase of additional plant, to take full advantage of the improved conditions which now prevailed in shipbuilding.

E. K. Cole, Ltd.—Presiding at the annual meeting held on May 20th Mr. W. S. Verrells (chairman and managing director) said that the extended factory space had enabled them to install new equipment in the tool section, and with the recently improved machine shop facilities they were now in a position to produce all their own metal parts should it be necessary. Last year they established an experimental radio valve plant, and they were now producing a certain proportion of "Ekco" valves at satisfactory production costs. Designs had been prepared for several different types of valves for the coming season, and in addition a number of special valves had been designed and made for the research department, with relation in particular to the television section. Commercial Facilities, Ltd., had been registered and now dealt with the hire-purchase transactions formerly handled by E. K. Cole, Ltd. They considered it advisable gradually to extend their range of products to embrace the electrical and associated

industries and were more rapidly increasing their turnover in Government contract work and bakelite mouldings. Their interest in Marconi-Ekco Instruments, Ltd., and Scophony, Ltd., should prove of increasing importance in the future. Scophony, Ltd., was undertaking some important television developments. An appreciable increase in turnover had been made in the Government contract and measuring instrument section. The bulk of the sales of this department of their business, which comprised test apparatus, measuring instruments, and electro-medical apparatus, was handled by Marconi-Ekco Instruments, Ltd.

Cable & Wireless (Holding), Ltd., held its annual meeting on Monday last, when Mr. J. C. Denison-Pender (governor and joint managing director), who presided, said that with regard to Marconi's Wireless Telegraph Co. there had been a satisfactory increase in its manufacturing business and it had paid a higher dividend. The operating company, Cable & Wireless, Ltd., had experienced a particularly eventful year. At home trade had continued to prosper, and abroad there had been some improvement in export trade and the tendency was satisfactory. The company had acquired and was now operating the telephone service in Cyprus; a new wireless station at Aden had been taken over; while a reorganisation of the West Indies group of companies was proceeding satisfactorily with a view to unification and resultant economy. Their concession in Greece had been renewed. That the time had arrived for the modification of the original charter under which the company operated was being recognised by various Governments of the Empire, and it had been agreed that an investigation should be made of their proposals. Mr. Denison-Pender dealt at some length with the capital reconstruction scheme (ELEC. REV., April 23rd) and said that in the event of the scheme being approved the preference stockholders would receive immediately in the new 4 per cent. funded stock the equivalent of the net amount of their arrears, while the "A" and "B" stockholders would receive a dividend on their reduced holdings in respect of the year 1937. At the same time, they would be in a sound financial position. Also once the scheme was approved and they were in a position to pay a dividend on all classes of their stock, it was their intention to resume interim half-yearly distributions on the preference stock.

The Clyde Valley Electrical Power Co. held a special meeting at Glasgow on May 19th at which the terms of a Provisional Order, for which application has been made to the Secretary of State for Scotland, were approved. The Order will authorise an increase in capital from £2,900,000 to £5,000,000. Mr. C. Ker (chairman), who presided, stated that at the end of the last financial year there had been expended a sum of £4,803,515, in providing the various works in connection with the company's undertakings, and therefore they had overspent to the extent of £1,903,515. An application had been made to the Electricity Commissioners to increase the capital by Special Order, but the Commissioners had claimed the right to regulate the terms of the issue, and refused to make the Order unless the directors agreed to issue the capital on the terms suggested by the Commissioners. These terms were considered by the directors as impracticable. While the Government intended, at a future date, to introduce legislation giving effect to most of the recommendations of the McGowan Committee, the directors considered it inequitable that the Commissioners should, without Parliamentary sanction, single out one recommendation of the McGowan Report and should seek to dictate terms on which the company's capital should be issued. Accordingly, the directors were promoting the Provisional Order, seeking, through Parliament, power to increase the capital as well as for other purposes.

The Anglo-Argentine Tramways Co., Ltd.—Meetings of the holders of the 4 per cent. and 4½ per cent. debenture stocks were held on May 25th for the purpose of considering the company's application for further moratoria in respect of the financial service of those stocks, the Duke of Atholl (chairman), who presided, said that in June, 1934, the debenture stockholders granted certain relief in respect of interest and sinking fund obligations due to them by the company. They were now asking them to extend that relief, but under prospects which were more hopeful than when the stockholders last met, owing to the enactment of the Law for Co-ordination of Passenger Transport in the City of Buenos Aires. Since they last met the Argentine Government's recognition of the urgency of the need for a stable and properly co-ordinated system of transport and of the great importance of saving from ruin the undertakings that must be the principal means of satisfying it, had been translated into action, and it was to the Law for Co-ordination that they now looked for a solution of most of their difficulties and for the restoration of financial equilibrium to the company and the urban transport industry generally in Buenos Aires. Owing to the absence of a quorum the meetings were adjourned until June 15th.

Telephone Rentals, Ltd., proposes to pay a final dividend of 6 per cent., making 10 per cent. for the year (against 8½ per cent.).

The Globe Telegraph & Trust is paying a final dividend of 5s. per £10 share net, making 11s., or 5½ per cent. net, for the year (against 4½ per cent. net).

Glenfield & Kennedy, Ltd., report a net profit for the year ended March 31st of £95,817, as compared with £84,443 in the preceding year. Reserve receives £31,250 and £9,732 is placed to the staff pension fund. The ordinary dividend for the year is maintained at 10 per cent. by the final distribution of 5 per cent., and £65,174 is carried forward, against £66,467 brought in. A capital bonus of 25 per cent. was distributed in June last.

Telephone Properties, Ltd., reports a net profit for 1936 of £38,735, as compared with £35,687 in the preceding year, to which is added £13,395 brought in, making £52,130. It is proposed to pay a dividend of 5 per cent. on the ordinary stock and to carry forward £19,120. The report states that the amount of dividend declared by the subsidiary company slightly increased, and the rates of sterling exchange again had the effect of substantially increasing the income received.

Callender's Cable & Construction Co., Ltd., is paying a final dividend of 10 per cent., making 15 per cent., less tax, for the year (unchanged), and a special cash bonus of 5 per cent.

Vactric, Ltd., announces that it is deferring the declaration of an interim dividend on the ordinary capital until the effect on trading of the recent fire at the factory at Cricklewood and the incidence of the National Defence Contribution can be more clearly ascertained.

The Scottish Power Co. is making an issue of 1,000,000 4 per cent. cumulative preference shares of £1 each at par. The issue, which will be made under the auspices of the Power Securities Corporation, will be applied in repaying temporary loans, in meeting capital expenditure on the Grampian Company's hydro-electric works, and in the development of the operating undertakings of the subsidiary companies.

The East African Power and Lighting Co. proposes to increase the authorised capital by £250,000 to £1,250,000 by the creation of 250,000 £1 shares, in order to meet the cost of future capital extensions when these become necessary. A meeting to consider the proposal will be held at Nairobi on June 10th. A final ordinary dividend of 4 per cent. is announced, making 7 per cent. for 1936 (same).

George Kent, Ltd.—Particulars of this company were published on Wednesday last for information only. The business was founded in 1838 and was incorporated as a private company in 1907. It was converted into a public company in 1920 and now has an issued share capital of £193,722. An issue of £225,000 of 4½ per cent. debenture stock is being made, the proceeds of which will be used for repaying the bank overdraft and providing further working capital. The company's business includes the manufacture of water meters and instruments and apparatus for the measurement and control of the flow of all fluids, whether liquid or gaseous.

The North Somerset Electric Supply Co. is offering 100,000 £1 ordinary shares at 30s. each to ordinary stockholders on the basis of one share for each £4 of ordinary stock held. The new shares will rank for dividend and in all other respects *pari passu* with the existing ordinary stock as from July 1st.

The Kalgoorlie Electric Power & Lighting Corporation has announced a final dividend of 4½ per cent., making 7½ per cent. for 1936 (unchanged).

Stocks and Shares

TUESDAY EVENING.

THE Stock Exchange and its clients have left no room for doubt as to what is their opinion of the Finance Bill. Notwithstanding the concessions that have been made, the main root of objection lies in the uncertainty which persists. The immediate effect of the news was to bring about a fall in most of the ordinary shares. Dissatisfaction was expressed on all hands. For the time being, business has become reduced to a low ebb. The feature of strength in Stock Exchange markets is the way in which preference share prices have improved. The present value of shares in rubber companies is particularly difficult to assess; prices have been lowered in the majority of cases.

N.D.C.

To what extent the profits of companies dealing with electricity supply and its branches will be affected by the National Defence Contribution is still a matter of uncertainty. The consumption of electric current, and the uses of electricity, are going ahead at such a rate that, although the companies manage to keep their increased profits within moderate bounds, there seems to be no immediate prospect of the progress being checked. Consequently, the new tax is liable to hit the various undertakings fairly heavily. So far, however, as dividend considerations are concerned, the conservative manner in which most, if not all, of the companies are managed, should tend to ensure maintenance of the rates—speaking generally, of course—that are at present being paid.

When it becomes possible to make a more exact calculation than can be given at the moment, the shareholder in electricity supply companies will be able to determine whether his interest is worth retaining or whether, for prudence sake, he should exchange into something else. So satisfactory has been the result of his investment up to the present time that it is hardly likely he will feel disposed to make any change unless the profits of his industry are seriously threatened. And this apprehension is modified by the concessions announced in the Finance Bill published on Monday in this week.

The McGowan Bill

More likely, perhaps, to influence the share market in the immediate future will be the Bill that is in preparation on the lines of the McGowan Report. When this appears it may prove something of a test for the nerves of shareholders. Taking the longer view, the electrical industry is so well-founded, and occupies a position of such increasing popularity, that the stability of the securities themselves may be expected to re-establish, in a short time, any decline brought about by reason, first of N.D.C., and, secondly, of possible legislation.

Preference Shares

The provisions of this year's Budget restored to preference shares, as a class, a good deal of the popularity which had previously been lost to them as a result of the decline in gilt-edged prices during the earlier part of the year. Explanation of the improvement lies, of course, in the fact that many investors have been persuaded by the threat of taxation on excess profits, to transfer their attention from the uncertainty of equity shares to securities on which the income is, at least, known and fixed. The result is seen in a marked reduction of preference shares on offer, and a ready demand for shares which holders had been experiencing difficulty, not long before, in realising. Among electrical equipment issues still available to the buyer in reason-

ably large numbers may be mentioned Associated Electrical 8 per cent. preference, at 40s., and Crabtree Electrical fives, at 24s. 9d. In each case, the yield is 4 per cent., and payment of the dividend is covered eight or nine times over by current earnings. General Electric preference and English Electric preference are both 1s. 6d. up on the week. Several of the supply companies' preference are 6d. to the good.

Tax-free Investments

Shares which, in common with preference descriptions, acquired from the Budget further merit in the eye of the investor, include for obvious reasons those on which the interest or dividend is paid without deduction of income-tax at source. Needless to say, those securities, which combine the stability of income from preference holdings with the attraction of tax-free dividends, are not now easily come by. There are, in any case, not a great many issues of the kind in existence; one or two, nevertheless, are to be found in the electrical markets. An example is the Calcutta Electricity Supply Company's 5 per cent. cumulative preference, which can be bought at the moment at 28s. 6d. The net yield of 3½ per cent., tax free, is equivalent to a gross return of £4 13s. per cent. where income-tax has to be deducted at the current rate. The shares constitute, of course, a good-class holding apart from their special immunity, which, incidentally, does not extend to taxation of over 6s. in the pound. The last published accounts showed a wide safety-margin for payment of the preference dividend.

Cable and Wireless

Market reaction to the proceedings at the Cable and Wireless meetings, at which approval was given to the capital reorganisation plan, favoured the Combine's preference stock rather than the ordinary issues. Since the first intimation of the scheme the position of preference stockholders under its provisions has been regarded, with good reason, as decidedly satisfactory. Formal approval of the proposals was, accordingly, followed by a further stiffening in the price of the stock, which is now up to 111¼. Despite reiteration of the hope that a 4 per cent. dividend should be available this year for the written-down ordinary capital, the prices of the ordinary stocks were held in check by the cautionary remarks directed against assumption of too-optimistic expectations from the improved traffic index figures of the past six months. The reminder that inroads will have to be made from various directions on the amount of profits available for distribution seems to be the principal reason for the subdued appearance of the ordinary stocks, of which the "A" stands at 15¼ and the "B" at 6¼.

Dividends and Reports

Distribution by Callender's Cable Company of a special 5 per cent. cash bonus in addition to the usual 15 per cent. dividend fell in closely with previous expectation. The price of the shares remains unaltered at 4¼½. Whether the extra payment should be brought into calculation of the yield on the shares is a moot point. Austerely, it ought not to be. On the total distribution of 20 per cent. the return is 4¼ per cent.; on the dividend alone it is £3 4s. per cent. Some people consider that the yield is, in any case, a consideration secondary to the financial strength built up by the company's conservative dividend policy.

Investors in the electrical equipment market have become so accustomed nowadays to company news of growing profits and liberal dividends that a break in the upward curve is a matter for surprise. When the break amounts to the halving of a dividend the feeling is more akin to shock. A reaction of the stronger kind was engendered by the Telegraph Condenser announcement of a dividend of 10 per cent., or half the previous year's distribution. That the cut was unexpected is clear from the ensuing slump in the price of the 10s. shares, which fell abruptly from 38s. 6d. to 25s. ex dividend. The market refers inquiry to last year's meeting, when mention was made of the effect of lower prices on a growing output.

Stock Exchange Statistics

The Stock Exchange Committee has recently instituted the publication of an annual report, giving details of the various directions of work conducted under the auspices of the official departments. Amongst the statistics in the report just out there appear the amounts of money represented by various groups of stocks and shares quoted in the Stock Exchange Daily Official List. Under the heading of electric lighting and power there were, as at March 24th last, the end of the Stock Exchange year, 189 lines of the Official List given to electric lighting and power, the nominal amount of capital outstanding being 205 million pounds, comparing with £192 million, £187 million and £180 million in each of the three previous years. The amount of new capital added to this particular item during the year 1936-7 came to close on 13 million pounds.

It is necessary to add that these figures do not take into account the companies connected with electrical manufacture and equipment, such as British Insulated, Callender's, General Electric, Henleys, Siemens, and others that appear under the separate heading of Commercial and Industrial. These latter, it is interesting to observe, total £1,221 million as the nominal amount outstanding in the 1,466 lines given in the Stock Exchange Official List to this particular group. The total nominal amount in the whole of the Stock Exchange Official List at that date, March 24th, came to £17,846 million.

Share List of Electrical Companies

Home Electricity Companies

	Nom.	Dividend. Previous.	Dividend. Last.	Price. May 25.	Rise or Fall	Yield. p.c. £ s. d
Bournemouth and Poole	1	15	15	72/6	−¼	4 2 9
City of London	1	7½	7½	35/0	—	4 5 9
Clyde Valley	1	7	8	43/-	—	3 14 5
County of London... ...	1	10½	10½	51/6	—	4 1 6
Edmundson's 7% Pref.	1	7	7	34/6	—	4 1 2
Do. Ord.	1	8	9	41/6xd.	—	4 6 9
Elec. Dis. Yorkshire	1	9	9	44/-	−6d.	4 1 10
Elec. Fin. and Securities	1	12½	12½	2⅞	—	4 7 0
Elec. Supply Corporation ...	1	11	12	57/-	—	4 4 3
Lancs Light and Power	1	7½	7½	34/-	−1/-	4 8 3
Lond. Assoc. Electric	1	—	7	33/3	—	4 4 2
London Electric	1	7	8	36/-	—	4 9 0
London Power Deb. Red. ...	Stock	5	5	106½	—	4 14 0
Metropolitan	1	10	10	47/6	−6d.	4 4 2
Midland Counties	1	7½	8	39/6	−6d.	4 0 0
Mid. Elec. Power	1	8	9	2⅜	—	4 5 0
North Eastern Electric Ordinary	1	6	7	33/6	−6d.	4 3 7
Do. 7% Pref.	1	7	7	35/-	+6d.	4 0 0
Northampton	1	10	10	48/9	—	4 2 0
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary ...	1	10	10	50/-	—	4 0 0
Do. do. 6% Pref. ...	1	6	6	31/6	+6d.	3 16 2
Scottish Power	1	8	8	39/-	−1/-	4 2 1
South London	1	7	7	32/-	—	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	22/-	—	6 16 5
Yorkshire Elec.	1	8	8	42/6	−6d.	3 15 5

Public Boards.

Central Electricity, 1950–70 ...	Stock	5	5	114	—	4 7 9
Do. 1955–75 ...	„	5	5	115½	—	4 6 7
Do. 1951–73 ...	„	4½	4½	110½	—	4 1 3
Do. 1963–93 ...	„	—	3½	98½	—	3 11 1
London Elec. Trans. Gtd. ...	„	—	2½	91	—	2 15 6
London & Home Counties, 1955–75	„	4½	4½	110	—	4 1 10
London Passenger Transport, A...	„	—	4½	115½xd.	—	3 18 0
Do. do. B...	„	—	5	115½xd.	−1	4 6 7
Do. do. C...	„	4	4	86	+2	4 13 0
West Midlands Joint Elec. 1948–68	„	—	5	112½	—	4 9 6

Telegraph and Telephone.

American Tel. & Tel.	$160	9	9	170½	+4	5 5 7
Anglo-Am. Tel. Pref.	Stock	6	6	125	+3	4 16 0
Do. Def.	„	1½	1½	29	—	5 3 5
Cable & Wireless 5½% Pref. ...	„	4½	5½	111½	+1½	5 0 0
Do. A. 7½% Ord.	„	Nil	Nil	25½	—	—
Do. B. Ord.	„	Nil	Nil	6½	−¼	—
Globe Tel. & Tel. Ord.	10	3½*	4½*	16	—	2 16 5
Do. do. Pref.	10	6	6	14	—	4 5 9
Great Northern Tel.	10	20	20	43	—	4 13 0
Marconi-Marine	1	10	7½	11	--	4 5 9
Oriental Telephone Ord.	1	12*	12*	3½	—	3 16 10

Home and Foreign Trams, etc.

Anglo-Arg. Trams First Pref. ...	5	Nil	Nil	7/-	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/9	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	21½	−1	—
British Electric Traction Df. Ord.	„	5	5	1475xd.	+30	—
Do. do. Pref. Ord.	„	8	8	165xd.	+3	4 15 5
Brazil Traction	$100	40 cts.	50 cts.	24½	+1½	—
Brit. Columbia Elec. Rly. Pcs. ...	Stock	5	5	105½	+1	4 14 9
Mexican Light Common	$100	Nil	Nil	3½	—	—
Do. 1st Bonds	$500	5	5	42½	—	—
Victoria Falls Ord.	1	20	12	66/3	+⅛	3 12 6
West Riding	1	6½	10	46/3	−½	4 6 6

Manufacturing Companies

Aron Electricity Ord.	1	10	15	2⅝	—	5 9 1
Assoc. Elec. Ord.	1	8	10	49/6	—	4 1 0
Do. Pref.	1	8	8	38/-	—	4 4 3
Babcock & Wilcox	1	8	10	50/-	—	4 0 0
British Aluminium Ord.	1	7½	10	51/-	+6d.	3 18 6
British Insulated Ord.	Stock	20	20	4⅜	−⅛	4 6 6
Brush Ord.	Stock	Nil	Nil	61½	—	—
Callender's	1	15	15	4½	—	3 4 0
Do. 6½% Pref.	1	6½	6½	30/-	—	4 6 8
Crompton Parkinson Ord. ...	5/-	12½	12½	61/3	—	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	3½	7	37/6	—	3 14 8
Enfield Cable Ord.	1	25	25	5⅜	+⅛	4 13 0
English Electric	1	Nil	Nil	33/6	+1/-	—
Do. do. Pref.	1	6½	6½	26/-	+1/6	5 8 4
Ericsson Tel.	5/-	20	25	51/3	—	2 8 10
Ever Ready	5/-	35	45	31/6	−9d.	7 2 10
Ferranti Pref.	1	7	7	27/6	--	5 2 10
G.E.C. Pref.	1	6½	6½	32/6xd.	+1/6	4 0 0
Do. Ord.	1	10	15	86/-	+1/-	3 9 7
Henleys	5/-	30	15	1	—	3 15 0
Do. 4½% Pref.	1	4½	4½	1⅛	—	4 0 0
India-Rubber Pref.	1	5½	5½	22/6	—	4 17 9
Johnson & Phillips	1	7½	10	43/9	−⅛	4 11 5
Lancashire Dynamo	1	10	20	3⅛	—	6 1 0
Siemens Ord.	1	6	7½	32/6xd.	+⅛	4 12 4
Telegraph Construction	£1	Nil	7½	2⅛	—	3 8 5

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

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21077. "Electron-discharge devices." W. S. Percival. July 24th, 1935. (Cognate application, 35039/35.) (464977.)
21323. "Control of electric transformers and dynamo-electric machines." C. A. Parsons & Co., Ltd., C. Giles and H. B. Topham. July 26th, 1935. (464858.)
22115. "Television transmission method." Radioakt-Ges. D. S. Loewe. September 4th, 1934. (465184.)
23775. "Shaping of metal articles by the passage through them of an electric current accompanied by stretching." G. Benedetto. September 24th, 1935. (465103.)
25946. "Apparatus for heating or cooking by electricity." Premier Electric Heaters, Ltd., and A. E. Newton. September 19th, 1935. (464861.)
26120. "Control systems for electric motors supplied through grid-controlled converting apparatus." Allmänna Svenska Elektriska Aktiebolaget. September 27th, 1934. (465104.)
26259. "Apparatus for the production of electrical oscillations." A. H. Midgley and A. M. Midgley. September 23rd, 1935. (464863.)
26497. "Television transmitting and like systems." H. G. Lubszynski. September 24th, 1935. (464919.)
26559. "Electric motor control systems." British Thomson-Houston Co., Ltd. September 27th, 1934. (464866.)
26571. "Protective means for electrical measuring instruments." H. S. Macadie and Automatic Coil Winder & Electrical Equipment Co., Ltd. September 25th, 1935. (464867.)
27176. "Television apparatus." Ferranti, Ltd., and S. Atkinson. October 2nd, 1935. (465108.)
28319. "Electric battery lamps." General Electric Co., Ltd., and F. C. Mayes. October 14th, 1935. (465186.)
29199. "Portable rotary electric power tools." Oliver Pell Control, Ltd., C. Oliver and J. R. Thorpe. October 23rd, 1935. (465039.)
29313. "Thermionic-valve amplifiers." Baird Television, Ltd., and P. W. Willans. October 23rd., 1935. (464979.)
29695. "Electric-wave filters." B. A. Meininghaus. October 28th, 1935. (Convention date not granted.) (464985.)
29738. "Lighting systems by sustained luminescence." Stella-Lux. October 29th, 1934. (Cognate application, 29739/35.) (465155.)
29824. "Electric circuit interrupters." Westinghouse Electric & Manufacturing Co. November 3rd, 1934. (465051.)
29861. "Thermionic amplifiers." British Thomson-Houston Co., Ltd., J. Moir and R. G. Hibberd. October 29th, 1935. (465053.)
29862. "Electric discharge devices." British Thomson-Houston Co., Ltd., and H. R. Ruff. October 29th, 1935. (465054.)
29863. "Electric oscillators." Baird Television, Ltd., and E. E. Wright. October 28th, 1935. (465055.)
29879. "Voltage-regulating relays." Ferranti, Ltd., and E. T. Norris. October 29th, 1935. (465058.)
29883. "Automatic control of alternating current electric motors operating centrifugal or other pumps." R. A. B. Hillestad. October 29th, 1935. (465059.)
29891. "Grid-controlled vapour-arc converting apparatus." English Electric Co., Ltd. (Siemens-Schuckertwerke Akt.-Ges.) October 29th, 1935. (465113.)
29892. "Cathode-ray tube television transmitting apparatus." H. Miller. October 29th, 1935. (465060.)
29954. "Electric coupling device for tapping supply mains." Stotz-Kontakt-Ges. November 1st, 1934. (465116.)
29973. "Amplifying circuits suitable in connection with television." British Thomson-Houston Co., Ltd., and D. J. Mynall. October 30th, 1935. (465118.)
29984. "Manufacture of coiled-coil filaments for incandescent electric lamps and the like." Hygrade Sylvania Corporation. November 8th, 1934. (465119.)
29995. "Carrier signalling systems." Siemens & Halske Akt.-Ges. October 30th, 1934. (465120.)
30026. "Contact members for electrical switches of the smaller kind. G. E. Crabtree, W. T. Elliott, E. Badham and R. W. Thornton (legal representatives of J. A. Crabtree (deceased)). October 31st, 1935. (465063.)
30035. "Television transmitter." Radioakt-Ges. D. S. Loewe. November 2nd, 1934. (Addition to 22115/35.) (465185.)
30049. "Coating of metal electrolytically." Sir M. Hicks, A. R. N. Heath and T. C. Tapp. October 31st, 1935. (465123.)
30055. "Electrical contact target device and a missile for use therewith." J. Tyllyer. October 31st, 1935. (465165.)
30095. "Electric railway toy." Vereinigte Spielwarenfabriken A. Fortner & J. Haffner's Nachfolger Ges. November 28th, 1934. (465168.)
30124. "Testing of electric circuits." British Thomson-Houston Co., Ltd., H. Trencham, and K. J. R. Wilkinson. October 31st, 1935. (Cognate application, 32336/35.) (465127.)
30180. "Wireless-controlled indicator for vehicles." E. G. F. Winkler and H. De Csarada. November 1st, 1935. (465129.)
30211. "Automatic switches for use in telephone systems." Automatic Electric Co., Ltd. December 31st, 1934. (465132.)
30226. "Guards for the contacts of electromagnetic relays such as are used in telephone systems." Standard Telephones & Cables, Ltd., and F. G. S. Powell. November 1st, 1935. (465133.)
30246. "Gasfilled electric lamps." Soc. Anon. pour les Applications de l'Electricité et des Gaz Rares. Etablissements Claude-Paz & Silva. February 8th, 1935. (465066.)
30247. "Electric discharge lamps and method of making same." T. W. Warren. November 1st, 1935. (465135.)
30248. "Reflector lamp for the illumination of long and narrow surfaces." Zeiss Ikon Akt.-Ges. November 2nd, 1934. (464870.)
30264. "Electric discharge lamps." British Thomson-Houston Co., Ltd., and L. J. Davies. November 1st, 1935. (465137.)
30316. "Television receiving circuit." Radioakt.-Ges. D. S. Loewe. November 6th, 1934. (465141.)
30327. "Electric induction motors." British Thomson-Houston Co., Ltd. November 2nd, 1934. (464871.)
30354. "Electron-discharge devices." C. S. Bull and J. E. Keyston. November 2nd, 1935. (465144.)
30364. "Electric contact-making devices." S. Saunders. November 2nd, 1935. (465069.)
30522. "Automatic volume control in radio receivers." E. K. Cole, Ltd., and G. Bradfield. November 5th, 1935. (465176.)
30560. "Television or like systems." Baird Television, Ltd., and D. M. Johnstone. November 5th, 1935. (465147.)
31677. "Sound translating devices." Standard Telephones & Cables, Ltd. December 29th, 1934. (464996.)
32020. "Electric switch control devices especially applicable to refrigerating plants." H. C. Heckman. November 19th, 1935. (Cognate application, 28498/35.) (464927.)
32329. "Arrangements for effecting control of the ignition of electric-arc convertors." General Electric Co., Ltd., and H. H. Taylor. November 21st, 1935. (464931.)
32345. "Thermal electric cut-outs, relays and like switching means." G. E. Whitehead and Whitehead's Electrical Inventions, Ltd. November 21st, 1935. (464932.)

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229. "Electrical switches of the type in which oil-immersed contacts are used." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. January 3rd, 1936. (465072.)
230. "Mounting of ammeters or similar electrical instruments in enclosed motor-protective and other switchgear units." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. January 3rd, 1936. (465073.)
3641. "Apparatus for receiving television and like electric signals accompanied by two or more groups of synchronising signals." General Electric Co., Ltd., and D. C. Espley. February 6th, 1936. (464946.)
3911. "Combined fan and electric heater units." Mather & Platt, Ltd., and S. W. Marsland. February 8th, 1936. (465010.)
5161. "Telephone systems." Siemens Bros. & Co., Ltd., and B. A. Hensler. February 20th, 1936. (465011.)
7223. "Glasses for electric discharge devices." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Gluhlampen). March 10th, 1936. (465077.)
7629. "Electric cable systems." Okonite-Callender Cable Co., Inc. March 16th, 1935. (464950.)
9594. "Method of preparing aluminium and its alloys for electro-deposition." Dr. Finckh Ges. April 9th, 1935. (465078.)
11109. "Electric hot-plates." H. Hofer. December 3rd, 1935. (465079.)
11538. "Control systems for variable-speed electric motor drives." K. G. T. Elmquist. May 3rd. 1935. (464880.)
13015. "Method of and apparatus for evaluating electrical service." A. R. Williams. May 8th, 1936 (464962.)
13206. "Negative glow electric discharge devices." A. F. Henninger, jun. May 9th. 1936. (464885.)
14826. "Illuminated advertising apparatus with a scintillating effect." A. Gentilini. July 29th, 1935. (465014.)
16965. "Coupling-coil systems for oscillatory electric circuits." Hazeltine Corporation. July 11th, 1935. (464970.)
17325. "Light-sensitive cell systems for the scanning of sound tracks." Dr. M. Arndt. March 21st, 1936. (464971.)
17953. "Driving of dynamos for railway and like vehicles." Eclairage des Vehicules sur Rail. July 1st, 1935. (464973.)
20506. "Current collector trolley-heads for electric vehicles." G. F. Sinclair and London Passenger Transport Board. July 24th, 1936. (465088.)
20714. "Wireless receiving sets." K. R. Jahn. July 27th, 1936. (464890.)
22204. "Electric incandescent lamps." General Electric Co., Ltd. August 12th, 1935. (465089.)
22253. "Modulator and demodulator networks for carrier current signalling and the like." Siemens & Halske Akt.-Ges. August 12th. 1935. (465019.)
22844. "Flashlight lamps." U. W. Doering. August 19th, 1936. (465021.)
22871. "Radio systems for detecting or spotting aircraft and other moving bodies." Telefunken Ges. für Drahtlose Telegraphie. August 19th. 1935. (465022.)
24610. "Piezo-electric crystals." Marconi's Wireless Telegraph Co., Ltd. September 30th, 1935. (464894.)
28540. "Ultra-short-wave radio transmitters." C. Lorenz Akt.-Ges. October 24th. 1935. (464975.)
30563. "Thermionic amplifiers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. November 11th, 1935. (465030.)
34822. "Spark-plug electrode." General Motors Corporation. December 7th, 1934. (Divided out of 33685/35.) (464912.)
35892. "Thermostatic control apparatus." Marconi's Wireless Telegraph Co., Ltd. January 31st, 1936. (464914.)

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3190. "Television." Radioakt.-Ges. D. S. Loewe. November 6th, 1934. (Divided out of 464831.) (465094.)

Scientific and Technical Books

About 2,000 new books on scientific subjects are issued annually by British publishers, Sir Richard Gregory states in an introduction to the Select List of Standard British Scientific and Technical Books (price 2s. 6d.), which has been compiled by the Association of Special Libraries and Information Bureaux. This 35-page booklet (including index) is intended to direct attention to a few existing works that are justly representative. The names of about 300 volumes are given under twenty-one headings. In a foreword Sir William Bragg, referring to the international aspect of such a compilation, points out that it throws into prominence certain peculiar features of a country's contribution to scientific advance and must include works of a "popular" character to give a fair idea of the position of science in Britain as a whole. It has also to include books which show how science has been brought into industry, which is indicated for example in the twenty-six works included under the title of "Electrical Engineering."

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Armadale.—Cinema, South Street, for the Star Theatres, Ltd.; A. D. Haxton, Commercial Road, Leven.

Ashton-under-Lyne.—Houses (32), Montague Road, for A. Morris & Co., Ltd., Firs Avenue.

Ayr.—Houses (152); burgh surveyor. Cinema for the Odeon Theatres. Ltd., Cornhill House, Bennett's Hill, Birmingham. Reconstruction of town buildings; J. and J. A. Carrick, architects, Ayr.

Barnes (SURREY).—Factory and warehouse buildings, Kew Works, Mortlake Road; Kent Bros. Electric Wire Co. and E. H. Phillips, Ltd.

Barnsley.—Houses (84), Worsborough Common; J. Taylor, borough engineer.

Berkhamsted.—Council offices and council chamber; H. & J. Matthews, Ltd., builders.

Bexhill-on-Sea.—Out-patients' department, Bexhill Hospital; Board of Management.

Bexley.—Development of Rochester Way estate; South County Freeholds and Cannon Syndicates, Ltd.

Birmingham.—Houses (747), Oscott College estate, Erdington; H. J. Manzoni, city surveyor, Council House. Furniture factory, for the Co-operative Wholesale Society, Ltd., Balloon Street; C.W.S. Architects' Department. Offices and private cinema, Broad Street, for the Odeon Theatres, Ltd., Cornhill House, Bennett's Hill. Additions to the works of Booth & Sons, Nechells; T. Rowbotham, builders, Coventry Road, Birmingham. Additions to the premises of Hawleys, Ltd., Kyrwicks Lane, Moseley (£20,000), with electrical work; Collins & Godfrey, builders, The Cross, Tewkesbury.

Bolton.—Extensions; Kay & Co. (Engineers), Ltd., Blackhorse Street.

Brighton.—Houses (33), St. John's Place and Mount Pleasant (£17,200); borough engineer. Houses (30), Tongdean Lane; Braybons, Ltd. Offices and shops, West Street; Phœnix Assurance Co., Ltd. Police quarters and courts, Old Market site (£136,000); J. L. Denman, architect. Massage dept., Royal Sussex County Hospital, Eastern Road; governors. Alterations and additions to Brighton College, Eastern Road; governors.

Bristol.—Dental school for University secretary.

Burton Latimer.—Extensions to works, Coles Boot Co., Piggotts Lane.

Carlisle.—Houses (148), between Wigton Road and Dalston Road, for C.C.; city architect, Town Hall.

Carnoustie.—Extensions to Anderson Grice Co., Ltd., Taymouth Engineering works.

Chichester.—Houses (34), Clay Lane, for C.C.; Hamfield Estate, Ltd.

Corby.—Factory, Oakley Road, for the Kettering Clothing Co-operative Society.

Cornwall.—Extension to County Hall, Truro (£5,000), for C.C.; S. Pool, county architect, Truro.

Coventry.—Branch library, Briscoe Road; E. H. Ford, city architect, Council House.

Denbighshire.—Extension to County Offices, Ruthin (£70,000) for C.C.

Dovercourt (ESSEX).—Cinema, High Street, for D. Bostock.

Edinburgh.—Factory, London Road, for Gillon & Bell, Ltd., Leith.

Essex.—School, White Horse Lane, Witham, and extension to Oldchurch Hospital, Romford (£369,000), for C.C.; J. Stuart, county architect, Chelmsford.

Exeter.—Flats, Prospect Place; city architect.

Gateshead-on-Tyne.—Houses (35), Sheriff Mount estate; L. Ather, builder, Felling-on-Tyne. Shops and houses, Southend Terrace, Sheriff Hill; F. Davies, architect, 560, Durham Road, Low Fell. Extensions to the Shipcote Cinema, Durham Road; S. J. Stephenson and Gillis, architects, 2, Saville Place, Newcastle-on-Tyne.

Girvan (AYRSHIRE).—Houses (50), Penkill Road; A. G. D. Grant, burgh surveyor, Knockushion Street.

Guildford.—Development of Tilehouse Farm estate, for A. B. Johnston; C. Osenton, surveyor. Alterations and additions to A.A. Offices, London Road; Automobile Association, Fanum House, New Coventry Street, W.1.

Halesowen.—Houses (200), Beecher Road estate, Cradley; borough surveyor.

Hartismere (SUFFOLK).—Houses (45); E. J. Symcox, architect, County Hall, Ipswich.

Hawarden.—Houses, Penarlag and Top-y-rhos; R.D.C. surveyor.

Hertfordshire.—County offices, Leahoe estate, Hertford (£279,884), for County Council.

Heywood.—Houses (67), Frankfold estate; Ridings and Hill, 55, Highfield Road, Blackpool.

Houghton-le-Spring.—Houses (76), U.D.C. Council estates; surveyor.

Hyde.—Three schoools (£44,000), for E.C.

Ilford.—Houses, Marlborough Drive, Barkingside; Theydon Bois Construction Co., Ltd., builders, Theydon Bois, Essex. Houses (66), Wensleydale Avenue: A. C. S. Wheeler, architect, 59, Windsor Road, London, E.7. Shops and flats, High Street, Barkingside: Suburban Real Estates, builders, 56, Kingsway, London, W.C.2.

Irish Free State.—(MACROOM, Co. CORK).—Houses (26), in concrete blocks; Jeremiah Collins, architect and engineer, Gurteenroe, Macroom. (BALLINGEARY, Co. CORK).—Vocational schools, Ballingeary, for the County Cork Vocational E.C., 27, Tuckey Street, Cork; D. J. Fierney, architect, 1, Prince's Street, Cork.

Kent.—Schools, Chislehurst, Crayford, Dartford and Dymchurch; county architect, Sessions House, Maidstone.

Kidderminster.—Library and biology room to Queen Elizabeth School for the Governors of Hartlebury Grammar School; Pritchard Godwin & Clist, architects, Bank Buildings.

Knaresborough.—Houses (39), and flats (£16,028); W. Birch & Sons, Ltd., builders, Spen Lane, York.

Lancashire.—Extensions to nurses' home, Park Hospital, Davyhulme, near Manchester; county architect.

Leek.—Factory for the Broughton Dairies & Creameries (Manchester), Ltd., 115, Broughton Lane, Lower Broughton, Manchester; W. Ingham, architect, Market Place, Leek.

Leicestershire.—Two schools, Homefield Avenue, and Turnbull Drive, Braunstone (£30,000) for County E.C.

London.—(BATTERSEA).—Cinema, St. John's Hill; F. C. Mitchell, 80, George Street, Portman Square, W.1.

Lowestoft.—Works for the Rist Cable Co.

Manchester.—Alterations and additions to Peacock Street school, Gorton, for E.C.; surveyor's department, Education Offices, Deansgate. Alterations and additions to the Princess Christian College, Wilbraham Road and Hart Road, Withington, for the Governors; W. Kennedy, architect, 14, St. Peter's Square.

Market Harborough.—Estate development, Rectory Lane: C. T. Bird.

Middlesex.—School, Victoria Park estate, South Ruislip, for County E.C., 10, Great George Street, Westminster, S.W.1.

Morecambe.—Houses (29), Walton Avenue; Widdup & Ladell.

Newcastle-on-Tyne.—Houses (24), Calderdale Avenue; Robson & Co., builders, Walker. Extensions to works for Donkin & Co.; W. Riddle, architect, 53, Denham Terrace, Wallsend-on-Tyne.

Newton-in-Makerfield.—Cubicle block and extension to administrative block of Earlestown Isolation hospital; J. Elston, architect, Earlestown, Newton-le-Willows, Lancashire.

Northamptonshire.—Infants' school, Croyland Road, Wellingborough, for County Council; W. E. Moore & Son, architects, Sheep Street.

Orrell.—Houses (41), and bungalows, site near Bell Lane; U.D.C. surveyor.

Redditch.—Offices and stores, Bates Hill; J. Wright & Sons, Ltd. Extensions to works, Victoria Street; British Needle Co., Ltd.

Rickmansworth.—Houses (52), Mill End (£19,572); Universal Housing Co. (Rickmansworth), builders.

Ruislip.—Cinema, Park Way; H. and D. Circuits, Ltd., Northolt Road, Eastcote.

Ryton-on-Tyne.—Houses (104), Crookhill; Newcombe & Newcombe, architects, 23, Eldon Square, Newcastle-on-Tyne. Estate development, Barmoor; Stella Coal Co., Ltd.

Sedgefield.—Houses (30), Council estates; R.D.C. surveyor.

Sedgley.—Houses Valley Road; A. E. Greensill. Extensions to mineral water factory Bilston Street: H. D. Millard.

Southend-on-Sea.—Children's homes, Shoeburyness; R. H. Dyer, borough engineer, Municipal Buildings.

South Shields.—Improvements to General Hospital; borough engineer.

Stalybridge.—Houses (164), Brushes Road site; L. O. Bottomley, town clerk.

Sudbury.—Development of Sudbury Court estate; Capt. E. G. Spencer-Churchill.

Sunderland.—Houses (36), St. Gabriel's estate: Bell Brothers, builders, South Back Cleveland Road. Hotel, Ann Street, for J. W. Cameron & Co.; A. Pearson, architect, Melvyn Gardens.

Thorne (DONCASTER).—Houses (132): U.D.C. surveyor.

Truro.—Dwellings, Trelander (£30,565); T. B. Rundell, builder, Truro.

Tunbridge Wells.—Assembly hall, police court and station, and fire station (£98,000): borough surveyor.

Tynemouth.—Flats (135), Percy Square; Sir J. Knott Memorial Trust, Ltd. Four shops, Ridges estate; H. D. Burton, Ltd.

Urmston.—Houses (30) and bungalows, Flixton Village; E. L. Leeming, U.D.C. surveyor.

Walsall.—Schools, Fullbrook and Harden; J. Taylor, borough surveyor, Council House.

West Hartlepool.—Aerodrome, Greatham; borough engineer.

Wolverhampton.—Turkish and medicated baths, adjoining the Central Baths, Bath Avenue; Henry Vale & Son, quantity surveyors, 21, Waterloo Road.

Worthing.—Alterations and extensions to Durrington Council school, for E.C.; school architect, Town Hall.

Yeovil.—Houses (40); Petter Warren & Roydon Cooper, architects, Old Sarum.

Uruguayan Electricity Supply Project

A start has been made on a scheme for the construction of a dam across the River Negro, in the centre of the country, and of an electric generating plant capable of producing 500 million kWh annually, according to a report in *The Times*. The dam will create a lake of 400 square miles and will be 1,000 yd. long and 30 yd. high. The electricity generated will be distributed all over the country by a network totalling 2,500 miles. When the work is finished the smallest village will have electric light and power, and it is estimated that Uruguay will then occupy sixth place among countries according to electricity consumed per head. The £6,000,000 contract has been awarded by the Uruguayan Government to a combine of the following firms acting in close co-operation with the German Government:—Siemens Schuckertwerke, Allgemeine Elektrizitäts-Gesellschaft, Siemens Bauunion, J. M. Voith, and the Geopé Compania General de Obras Públicas, of Buenos Aires. The German Government has agreed to accept Uruguayan meat, wool, and hides to the value of £1,561,754.